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TECHNICAL PROGRAMS IN THE ALBERTA COLLEGE SYSTEM

BY

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled Technical Programs In The Alberta College System, submitted by Clark R. Tingley in partial fulfilment of the requirements for the degree of Master of Education

ABSTRACT

The stated general aim of the study was to assist with the development of a rationale for technical education in Alberta by providing descriptive materials about technical programs in four specific areas: (1) program statistics, (2) statistics on the time distribution of various instructional methodologies, (3) the distribution of time among curriculum elements, and (4) the role of the graduate.

The literature which was reviewed and which formed part of the basis for the above division was concerned for the most part with: (1) philosophies and purposes of technical education, (2) institutional patterns for technical institutes, agricultural colleges and community-junior colleges, (3) the place assigned to general education in technical curricula, (4) the student-centred, the employer-centred, or the manpower-centred approach to program planning and enrolment, and (5) the pattern of research activity together with notice of recent Alberta based studies.

A questionnaire was designed, tested and distributed to the program supervisors in the five colleges, the two technical institutes and the three agricultural colleges. This questionnaire was completed and returned for sixty-seven programs. The data were coded into thirty-five variables and processed by computer to produce means, standard deviations and product-moment correlation coefficients, for first and last year programs. The means, standard deviations, and correlation coefficients were treated as descriptive statistics, given in tabular form, and commented upon.

Common institutional patterns for two of the three categories of institutions were observed for eight variable pairs as evidenced by correlations having probabilities below the .05 level. For institutes and junior colleges these were, first, long programs with low entrance requirements, and second, newer programs with higher entrance requirements. For institutes and agricultural colleges these were, first, a long instructional year with high last year enrolment, second, time for Lecture-Demonstration in the first year with time for Technology (Practical) in the last year, third, time for Lecture-Demonstration with time for Technology (Practical) both in the last year, fourth, time for Technical Education (Theory) inversely with time for Technology (Practical) both in the first year, and fifth, time for Technical Education (Practical) inversely with the time for Technology (Theory) both in first year. Finally, for agricultural and junior colleges this was time for Individualized Instructional Aides with time for Technical Education (Theory) both in the first year.

Opposite institutional patterns were observed for institutes and agricultural colleges for three variable pairs. There was a direct association for agricultural colleges and inverse for institutes between enrolment and time for Technical Education (Theory) both in the last year. There were similar associations between Field Trips in the last year and time for Technology (Practical) in the first year. There was a direct association for institutes and inverse for agricultural colleges between the time for Technical Education (Theory) in the first year and time for Technology (Theory) in the last year.

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The principals of the agricultural colleges and the presidents of the colleges and technical institutes provided support which is appreciated both by arranging for the distribution of the questionnaires and for designating which programs met the definitions in the study. Particular thanks are due the program supervisors who completed and returned the questionnaire on their programs.

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CHAPTER I

TOWARD A RATIONALE FOR TECHNICAL EDUCATION

The Problem

A problem of technical education in Alberta is that a rationale for this kind of education has not evolved. Technical programs continue to be developed at institutes of technology and they are being rapidly introduced at colleges of agriculture and some public colleges on a piecemeal basis. Attempts to coordinate these developments between institutions can at best have limited success before their goals have been articulated within institutions. The task is, then, to move toward the development of a rationale for technical education.

The General Purpose of the Study

This study could not expect to provide a rationale for technical programming that would be acceptable to those guiding technical education in Alberta, but information on current technical programs could lead to a better understanding of relevant concepts and probably to a change in the intellectual climate associated with technical education in this province. This diffuse, long term goal was also the motivation for the only other recent Alberta study of technical programming which examined an associated area. Williams stated:

> Administrators need a frame of reference which is comprehensive enough to bring into full view all the forces, and the sources of the forces, which impinge on technical education and control the direction it must take.

> . . . the study is seen as a significant, if small, step toward a rationale or framework within which the purposes of technical education may be more systematically understood.[1]

Another indication that a philosophical basis for technical education is desirable was given in a report to the Minister of Education for Alberta on the Southern Alberta Institute of Technology which asked:

> . . . what aims or objectives has the Department of Education established for the two provincial institutes; in effect, what is the educational philosophy underlying and directing technical development?
>
> The answer is that no such philosophy exists. Nowhere in departmental literature can one find a statement of purposes outlining either the limits or objectives of institute development. . . .[2]

It is expected that the more specific objective of this study, to describe the current technical programs in Alberta, will contribute toward the more general objective of moving toward a rationale for technical programming.

The Specific Objectives of the Study

This study describes the technical programs offered in Alberta by the public colleges, the colleges of agriculture, the institutes of technology, and these three collectively as the "college system", by providing data on thirty-five variables. These thirty-five

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[1]John C. Williams, "Goals in Technical Education" (unpublished Master's thesis, The University of Alberta, Edmonton, 1967), pp. 5-6.

[2]The Minister's Select Committee, "Report on the Operation of The Southern Alberta Institute of Technology and the Alberta College of Art" (Edmonton: The Alberta Department of Education, 1969), pp. 4-5. (Mimeographed.)

variables comprise four groups of information: (1) descriptive characteristics of programs, (2) instructional methodologies, (3) curriculum elements in programs, and (4) types of employment goals for graduates. A further objective of this study, beyond providing means and standard deviations for these variables, was to indicate the degree of association between pairs of variables by giving correlation coefficients as part of the description. These dimensions, intended to reveal the major aspects of programming, are considered necessary prerequisites to any in-dept research activity on technical education.

Limitations of Programs Considered

There may have been a period in time when technical training in Alberta had passed the trade level and had yet to encompass non-engineering areas such as business education, the communication arts, and the paramedical technologies. If this period ever existed it would coincide in an approximate way with the decade of the nineteen-fifties. With the coming into force of the Technical and Vocational Training Assistance Act, passed by the parliament of Canada in the early nineteen-sixties, a new era began which saw non-engineering technologies being rapidly introduced into technical institutes as well as into colleges of agriculture, and, to some extent, into the public junior colleges. This investigation uses a definition of "technical program" (infra p. 48) which concentrates on those programs that would have been considered technical prior to nineteen-fifty by requiring that a technical

program be based on at least one of the non-social sciences or mathematics. This restriction was introduced because these engineering based programs had established an identity which is just becoming established for the newer kinds of programs. The Minister's Select Committee, in their study of the Southern Alberta Institute of Technology, sought for a definition of the newer programs and found a definition to be elusive. The following was stated:

> In creating a design for the preparation of industrial technologists the Institute provided a pattern for the preparation of other sub-professional groups. . . .
>
> Having created the pattern the Institute was asked to move beyond the industrial field to apply this design in the social service and business area.[3]

This study will concentrate on the programs which serve to provide the pattern rather than on the programs developed from it.

Some Preliminary Definitions

Definitions of terms used in the immediately following material are useful at this stage. These definitions are intended to reflect usage in the literature rather than provide description of institutions or practices in Alberta.

> General Education. General education refers to courses in oral or written communication, supervision, industrial sociology, economics, national and international affairs, labour relations, literature, art and national culture.[4]
>
> Technical Institute. Technical institutes have been particularly identified with curricula in the engineering technologies, and have long enjoyed close relationships with the engineering profession. They are generally

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[3] *The Minister's Select Committee*, *op. cit.*, p. 4.

[4] Donald W. Ford, *College Programs (A)* (Edmonton: The Provincial Board of Post-Secondary Education, 1968), p. 18.

single-purpose post-high-school institutions with programs averaging two years in length. Many of them have been privately endowed or proprietary institutions with sizable tuition and fees, selective admission policies, and rigorous programs of study.[5]

Community College. An institution of higher learning aimed at serving the needs of a particular community. It is a two-year college offering in its curriculum various programs which prepare students to enter definite vocations.[6]

Junior College. An institution offering two years of instruction of strictly collegiate grade. It most frequently provides courses offered in the first two years of a four-year college.[7]

The Organization of the Study

This study has the following pattern. It commences by stating that the problem is to describe technical programs offered in The Alberta College System. Concepts from the literature are presented and used as a basis for the development of a questionnaire. The method of identifying technical programs is stated and the procedure used to have program supervisors complete the questionnaire is given. The results obtained were coded, put on computer cards, and processed. Results are given and comment on the results is provided. Certain implications are stated and suggestions for further study are made.

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[5] Grant Venn, *Man, Education and Work* (Washington, D.C.: American Council on Education, 1964), p. 92.

[6] Henry Kolesar, *Post-Secondary Education: A Brief Review of the Literature* (Edmonton: The Provincial Board of Post-Secondary Education, 1967), p. 8. This Definition is from Tyrus Hillway, *The American Two-Year College* (New York: Harper and Brothers, 1958), p. 6.

[7] *Ibid.*

CHAPTER II

CONCEPTS FROM THE LITERATURE

This chapter contains a review of recent writings concerned with questions such as the following: (1) What are the purposes of technical education? (2) What philosophies have been developed to rationalize these purposes? (3) How may these philosophies be organized into an understandable continuum? (4) What curriculum model applies best to Alberta based programs? (5) What should be the place and function of General Education in the curriculum? (6) Should programs be student or employer oriented? (7) What is the technical education approach to research? Finally, (8) What recent research has been done in Alberta institutions? In some cases, these concepts are expanded and accompanied by speculation or observation relating to the three categories of post-secondary institutions considered in this study.

The Purposes for Technical Programs

Byrne[1] develops a frame of reference for vocational and technical education for the secondary school level in which he gives the following as the most influential considerations: (1) past experience in vocational and technical education, (2) the nature of contemporary society and the consequential demands on the

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[1]T. C. Byrne, "A Conceptual Framework for Vocational and Technical Education", The Canadian Schools and Manpower Development, Peter F. Bargen, editor (Toronto: The Ryerson Press, 1967), p. 1.

school, (3) evidence provided by recent research, and, (4) the values inherent in a public system of education. These considerations appear to have equal validity for the publicly supported post-secondary sector of education. Fast, in a statement for the Provincial Board of Post-Secondary Education, states the philosophy underlying the College System: it is "to serve as broad a clientele as possible of that group of students which leaves high school but does not wish to or cannot enter university."[2] This philosophy appears to be student-oriented.

The Ontario Department of Education gives the following as the purpose for their Colleges of Applied Arts and Technology.

> Colleges of Applied Arts and Technology are neither universities nor extensions of the secondary school; they will find their identity in service to that large segment of society that is inadequately served by the university; that is, those students and adults whose failure to recognize the applicability of the humanities, languages or abstract mathematics to their own lives has made them potential or actual drop-outs. Programs of instruction in the Colleges, therefore, will encourage a learning atmosphere in which such students may feel reasonably comfortable -- emotionally and socially; educationally and economically.[3]

The Ontario view of technical education was, then, that a particular kind of institution is required that is not articulated with the school-university progression and that these institutions

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[2]R. G. Fast, Some Guidelines For a Post-Secondary Program Approvals Committee (Edmonton: The Provincial Board of Post-Secondary Education, 1968), p. 2.

[3]Ontario Department of Education, Colleges of Applied Arts and Technology: Basic Documents (Toronto: The Information Branch, Ontario Department of Education, 1967), p. 33.

will attract students who were less than enchanted with the more academic high school subjects. Stewart, in his study of junior colleges in Alberta, noted that such students exist by quoting extensively from The Academic Board of Higher Education in British Columbia (1965).

> Many studies have shown that people's abilities differ not only in degree but also in kind, and many secondary school graduates whose abilities do not tend specifically toward academic and bookish studies are capable of excelling in other ways. They may surpass many university graduates in their ability to deal effectively with people; their ability to manage practical and technical affairs; their artistic, musical or dramatic talent; their capacity and initiative in getting things done; and in terms of their sheer good sense, judgment and responsibility.[4]

One response to the conclusion that technical education may be different in kind from university education is to attach technical education to the secondary school system. This has been done in Alberta to a limited extent by providing the first year of the three-year articulated technologies in the vocational high schools. Educators in the State of California take this idea much further.

> The community-junior colleges of the State of California are part of a system which differs markedly from the system of other states. This difference derives in part from the philosophy of education pervading the thought of many California educators. This philosophy holds that community-junior college education is secondary not higher, and that the thirteenth and fourteenth years should be integrated with, and be a continuation of the prior program.[5]

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[4]Andrew Stewart, Special Study on Junior Colleges (Edmonton: The Queen's Printer, 1965), p. 20.

[5]Maurice R. Graney, The Technical Institute (New York: The Centre for Applied Research in Education, Inc., 1964), p. 41.

While the statements of purpose that exist for Alberta based programs appear to avoid association with any of the above positions identifying post-secondary education as being exclusively higher or secondary education, the practice is to include public programs other than those in the university and school systems as coming under the post-secondary umbrella. Frequently the term "adult" is employed to indicate that these persons will be admitted to institutions, though not necessarily to the program of their choice, regardless of previous academic achievement.

The Nature of Technical Education

Operational definitions for terms are given in the methodology section elsewhere in this study; however, conceptual definitions are useful at this stage. Graney, whose orientation tends to favour technical institutes, explains the function of technicians:

> . . . any field of productive effort embracing professional practitioners on the one hand and skilled operation on the other presumably could have a middle liaison group of technicians. Engineering technicians, physical science technicians, and medical, biological and dental technicians come readily to mind. It does not take much imagination to conceive of technician level activities in business, in industrial production and operations, in manufacturing and institutional supervision, and so on.[6]

Two kinds of technician are implied in this statement. The first category of technician is the traditional one depending on a level between the professional and the skilled operator. The

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[6]*Ibid.*, p. 51.

second, and newer category, which is an extension from the first, implies that the individual designated a technician does complicated or specialized work and is not necessarily associated with a professional. Examples of the latter category are dental assistant, data processing technician, and distributive technician.

The concept of level is also associated with difference between the terms "vocational education" and "technical education". McLune's use of these terms corresponds with the Alberta practice.

> Vocational education, in the broad sense, is formal instruction which prepares individuals for initial entrance into, and upgrading within, a socially approved occupation, or group of related occupations, at the high school and post-high school levels. . . .
>
> In actual practice the term "vocational education" has come to be used in a more restricted sense. It is commonly associated with the initial stage of preparation for certain vocations at the high school level of formal education. The term "technical education" has come to be associated with formal programs of instruction in a variety of occupations at the post-high school level.[7]

Philosophies for Technical Education

Thornton[8] identifies two viewpoints on the purpose of education. The rationalist takes the position that the aim of education is the cultivation of the intellect for its own sake. The realist sees the cultivation of the intellect as a means to an end.

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[7] W. P. McLune, Vocational and Technical Education in Illinois (Urbana: Bureau of Educational Research, University of Illinois, 1960), p. 28.

[8] James W. Thornton, The Community-Junior College (New York: John Wiley and Sons Inc., 1960), pp. 4-6.

McGrath[9] observes that these two views are not mutually exclusive. On the one hand individuals are provided with opportunities for intellectual development and this is a part of the aim of the rationalist. On the other hand society obtains a supply of intellectual manpower which is the end the realist seeks.

It is useful to identify these two positions as they impinge on technical education. Indeed, for technical education, an intermediate or transactionalist position may be the one most frequently observed. To give meaning to this kind of division, the characteristics of technical education are described briefly, and necessarily superficially, prior to examining the relevant literature.

A Conceptual Framework: Three Orientations

The first orientation considered is that of the rationalist. The rationalist tends to assign priority to general education. When technical programs are offered, it is as an inducement to students to enrol who would probably otherwise not attend an educational institution and who have yet to appreciate the value of general education. This tactic is identified by Mitchell for the high school level:

> Vocational education programs at the high school level encourage a significant portion of the youth to remain in the high school and thereby continue to raise their general level of education. This has been referred to as the "peg theory" in that the outcomes of general education are

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[9]Earl J. McGrath, Universal Higher Education (New York: McGraw-Hill Book Company, 1966), pp. viii-ix.

> somewhat concomitant with those of specific education. This theory is not well received by vocational authorities. However, if these programs are a vehicle to keep youth in institutions where they develop intellectually and mature socially one can have little cause to argue with it. There is general acceptance that modern youth will require a rather high level of general education in order to participate adequately in the society in which they will find themselves.[10]

Since the purpose is general education, the technical curriculum will assign a substantial fraction of the time for instruction to the "core" or "tool" subjects, supplemented in most cases by forced choices from among optional courses in the humanities and the social sciences. This academic position is traditionally associated with technical educators in junior colleges, community colleges, and some colleges of agriculture.

The realist, with an orientation to employers' needs, sees these needs being met by providing students, the potential employees, with high level conceptual and physical skills. This position is typically associated with the technical institute based educator. Many educators who have this orientation consider courses in subjects such as mathematics and physics to be the best kind of general education. This use of the term "general education" focuses on the notion of permanence implied by teaching fundamental principles rather than particular applications. This is in contrast with the use of the term by more academically oriented individuals who use

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[10]Jack P. Mitchell, "The Current Status of Vocational Education in Canadian Secondary Schools," <u>The Canadian Schools and Manpower Development</u>, Peter F. Bargen, editor (Toronto: The Ryerson Press, 1967), pp. 26-27.

the term to imply an inter-disciplinary approach to curriculum building.

The position intermediate to that of the rationalists and the realists is designated here as the transactionalist. The transactionalist does not acknowledge that the needs of either students or employers are paramount; these needs are situational. The orientation to students' needs ensures that some attention will be given to general education even if it does not appear overtly in the curriculum, and the orientation to employers' needs ensures that the program will provide employer desired skills. Since course length is generally restricted to two years, compromises in curriculum have to be made, typically, by concentrating on skills at entry-to-employment level rather than developing skills in depth. These three positions, the rationalist, the realist, and the transactionalist, provide a conceptual framework to which concepts from the literature may be related. Since technical programs evolved in many instances from programs in technical institutes, the characteristics of these institutes is examined first.

Technical Programs in Typical Technical Institutes

The motive for technical education is demand for technical services. Byrne states:

> It is labouring the obvious to comment on the social effect of a rapidly changing industrial technology. These effects, nonetheless, create demands that have

> forced us to re-examine traditional practice in vocational and technical education.[11]

The traditional demand on the school has been to provide general education to students who would enter employment directly if they did not continue to university. The suggestion is now that this traditional emphasis on general education must be decreased, possibly even at the secondary level, so that the demands of employers receive more recognition.[12] The needs of employers have been articulated, at least in Alberta, through advisory committees to particular technical programs at the technical institutes and the colleges of agriculture. The Minister's Select Committee state in their report on The Southern Alberta Institute of Technology as follows:

> There has existed over the years a very close relationshop between the business and industrial communities of Canada and the Institute staff, which has motivated students to enrol in Institute programs. So much so that no other educational institution in this province (other than its counterpart in Edmonton) enjoys a similar approval from this particular sector of society. While this close relationship may be viewed with suspicion by those who fear the domination of industrial interests over education, the Committee recognizes the importance of this rapport and the necessity to maintain the unique educational quality which the institute has derived from it.[13]

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[11]Byrne, op. cit., p. 4.

[12]The view that general education is oriented toward the needs of individuals appears to be a particularly North American attitude. In Europe, where educational systems and governments tend to be more centralized than they are in Canada and the United States, general education is seen as having the function of promoting a common culture for a country's youth "mainly with a view to social cohesion." Roger Gregoire, Vocational Education (Paris: Organization for Economic Co-operation and Development, 1967), p. 36.

[13]The Minister's Select Committee, op. cit., p. 16.

It has been observed that advisory committees are not always consistent in the way they use their influence. One trend that has been noted is that advisory committees tend to support the aims of general education in their statements; however, the hiring practices of industry, from which the committees are drawn, tend to favour the specific technical skill possessed by graduates over achievement in general studies. The following statement by Filion, which relates to the educational system in the province of Quebec, is unusually candid but gives the typical employer position:

> The headlong race for literature, moral and political science to the detriment of technical and administrative science, both at the junior college level and the university level, will lead our youth once more into a dead-end.
>
> They will become fancy talkers and earnest reformers, but they will be unable to use their ten fingers.[14]

What employers desire is a supply of skilled graduates, who, hopefully, will also act as a stabilizing influence in society. Emerson speaks for the technical institute with high-level programs capable of graduating just this kind of employee for industry:

> The principal objective of the technical institute is the training of engineering technicians, qualified to serve as aides to engineers and scientists. With programs offered at the post-high school level, and curriculums that demand a high grade of student competency and effort, it gears in closely with present-day needs of industry for technicians.[15]

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[14]Gerard Filion, "The Diagnosis," The Financial Post, May 3, 1969, p. 3.

[15]Lynn A. Emerson, "Technical Training in the United States," Appendix I, Education for a Changing World of Work (Washington, D. C.: Government Printing Office, 1963), p. 54.

Graney is even more specific about how this kind of technician should be trained and indicates the difference between this kind of training and the training provided in institutions administered by vocational educators:

> . . . a technician graduated from a technical institute program administered by vocational education personnel if job-oriented. He has been trained in a program aimed at the needs of a closely-knit family of occupations. Courses in the program for example are designed to qualify the graduate for entry employment in a job . . .
>
> In contrast with this, the technician graduated from an engineering-oriented technical institute is educated to work in a supporting role to a professional. Greater emphasis is placed upon subject matter area or an academic descipline than upon job preparation. He is taught by individuals who intend to imbue him with an approach to a problem, or a method of attack, so that he can assist the professional at work rather than perform in a job.[16]

Graney is jealous of the reputation gained by technical institutes and warns against programs given in other than these institutions under the technical label. Concerning these other institutions' programs he writes:

> An examination of the content would lead one to conclude that the type of curriculum being offered should prepare technicians comparable to those being graduated by the established technical institutes of the country. This conclusion is subject to question, however, when one examines the administrative organization responsible for the operation at both the state and local levels.
>
> State boards of vocational education are oriented toward the secondary vocational school objectives . . . . The objective of vocational technician training is to prepare adults for entry level employment. . . This objective misses, as a rule, the higher education emphasis

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[16]Graney, op. cit., p. 7.

> upon subject matter competence and identification with a professional field. The overriding concern about instructional methodology and job competence tends to negate the higher education concern about the rigor of academic discipline and the versatility to deal with unknowns.[17]

Technical institutes have a reputation for providing rigorous programs. This kind of rigor may be reasonable when graduates are assured of employment in the technology for which they trained. Educators from the secondary and junior college systems have opted for a substantial general education component because they have traditionally been required to provide training programs for persons whose ultimate employment field remains undecided. These institutionalized patterns appear to be replicated in the United States, Canada, and Alberta except that the general education function of junior colleges, as distinct from emphasis on university transfer programs, is just emerging in Alberta.

Three tentative positions might be constructed to defend likely patterns of specific and general education. The first position might state that specific education is superior to general education regardless of whether ultimate employment was related to the specifics of the education. The second position might state that general education is superior to specific education. The third position would be that specific education is superior for those who may be assured of employment in the area of their specialty and that general

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[17] Ibid., p. 45.

education is best for others. Apparently there is some doubt that education and employment either are or should be related.

Kolesar quotes the following definition for an institute of technology: (his emphasis)

> Institute of Technology. Institutions which offer instruction in technical courses which prepare students to enter directly into semi-professional positions in agriculture, business, industry, home economics, and related fields. They offer no instruction in the liberal arts.[18]

The lack of studies in the liberal arts at technical institutes is generally conceded by their administrators in spite of occasional instances where these kinds of institutions have some of this in their programs, and, as a consequence, their graduates are sometimes described as "technical barbarians". Harris, who speaks for community colleges, is spokesman for a different view of technical programming. He draws attention to some of the excesses of technical institutes:

> Technician programs which almost parallel lower division engineering curriculums result in high attrition rates, too few graduating technicians, and general dissatisfaction with the community college's technical education program. In some communities, such an approach has resulted in the establishment of a post-high school technical school to serve a need which the "community" college has chosen to ignore.[19]

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[18] Henry Kolesar, Post-Secondary Education: A Brief Review of the Literature (Edmonton: The Provincial Board of Post-Secondary Education, 1967), p. 9. This definition is from Tyrus Hillway, The American Two-Year College (New York: Harper and Brothers, 1958), pp. 26-27.

[19] Norman C. Harris, Technical Education in the Junior Colleges/ New Programs for New Jobs (Washington, D. C.: American Association of Junior Colleges, 1964), p. 68.

Harris does not confine himself to what is wrong about the technical institutes, in his opinion, but continues to establish an approach to technical education in the junior-community college.

<u>Technical Programs in Junior-Community Colleges</u>

Harris begins by stating the purpose and level of this kind of education in junior or community colleges:

> Semi-professional education is organized in college-level curriculums of two or more years in length, leading to an associate degree, and designed to prepare the student for employment in one of several fields recognized as nearly professional in status. Examples of semi-professional jobs are registered (bedside) nurse, private secretary, research assistant, architectural draftsman, medical technician, engineering technician, surveyor, business data processing technician.[20]

Some of the programs mentioned above are less rigorous than others. To provide for exceptionally able students he proposes that institutions have a two-track system:

> Some junior colleges and technical institutes with large enrolments in technical education prefer to establish two curriculum tracks -- one at the semi-professional technician level, and one at the highly skilled technician level. Under this plan all, or nearly all, of the courses required in the semi-professional curriculum are different from and possibly more rigorous than those for the highly skilled technician curriculum.
>
> Colleges just beginning a technical program or colleges with small enrolments cannot, however, provide such a proliferation of courses.[21]

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[20] *Ibid.*, p. 61.

[21] *Ibid.*, p. 68.

He gives examples of subject lists and associated times required for typical programs. The first year programs concentrate on the technical and "tool" subjects with the general education content concentrated in the second year. Examples of general education subjects are: American history, economics and psychology.[22] There is a suggestion that the division into two tracks may occur only for the second year in some programs. In at least some of the programs, students who are quite successful are given an opportunity to transfer into the semi-professional level in the second year. First-year students might take a mathematics course which would be adequate for the highly skilled technician and he would not take further mathematics. The semi-professional technician program would use this first year mathematics course as a foundation for a rigorous mathematics course in the second year. The advantages of putting all students in an associated employment area into a common first year are obvious in an area where predicting success of students from entrance characteristics is as uncertain as it is in technical education. The limitation is that the employment market must be large enough to support two levels of technician. At present the junior colleges and colleges of agriculture in Alberta have small technical departments and two of the junior colleges have yet to establish these programs. The colleges established in the two largest cities may reasonably aspire to this two-track arrangement.

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[22] _Ibid._, pp. 68-73.

The two technical institutes have programs of various levels, but, as is shown subsequently, few programs are subdivided on the basis of level. A well established exception to this is the Chemical Technology Program and the Chemical Research Technology Program where the difference of level is established with the more rigorous work being confined to the second year. Optional programs are also available in electronics in the two institutes, but at this stage it is not clear that there is an ordered system of levels, and if there is they lack public identification.

It might appear from this discussion that the technical programs in technical institutes and junior and agricultural colleges are similiar. Graney (supra., p.16) is careful to point out that, in his opinion, the differences are quite profound. This difference may be accounted for by the differences in orientation; namely, an orientation to employers by technical institute educators and an orientation to students by junior college educators. Quite obviously this overstates the situation and many educators would not have an identifiable orientation, and a position independent from these two extreme positions is required.

The Case for an Intermediate Position

One societal approach is to encourage the establishment of many different kinds of educational institutes, each of which will survive or perish depending on whether or not a societal need is met. It might be assumed that technical institutes survive if they meet the needs of employers and junior colleges survive if they meet the

needs of students. Quite obviously, the situation is not this simple since, first, the two categories of institution are not publicly identified with these two societal groups, and second, survival of institutions dependent on public funds is decided on political rather than on an economic basis. The present system permits institutions with quite different orientations to function in the same pluralistic society. The question arises: What other societal pressures counter the laissez faire approach to technical education development? One of the main objections to the present approach is that it is divisive of society. Snow[23] observed that this particular division was particularly evident in the United Kingdom and that the division was fostered by a lack of communication between the divided elements. He speaks about the division between the literary intellectuals and the professional physical scientists. "Thirty years ago the cultures had long ceased to speak to each other: but at least they managed a frozen smile across the gulf. Now the politeness has gone and they just make faces."[24] Technical education appears to exist in a gulf of similar kind between the academic and the scientific-engineering establishments. One tactic that may be employed to cause communication between the two groups is to require that the post-secondary educational activities

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[23] C. P. Snow, _The Two Cultures and the Scientific Revolution_ (New York: London: Cambridge University Press, 1962), p. 19.

[24] _Ibid._

supporting the two positions take place on the same campus even if different program patterns are being taken. This means that the educational administrators on this kind of campus must adopt a pluralistic stance; they cannot acknowledge an orientation to either extreme position.

The Transactionalist Orientation to Technical Programming

The prime requirement for the transactionalist position is that the demands from competing groups be balanced. Byrne, speaking of the parallel situation for the employers of apprentices and the vocational secondary program, states:

> The number of people apprenticing for a designated trade is depressed, on the one hand, by labour's fear of an over-supply of workers, and enhanced on the other, by industry's desire for an adequate supply of relatively cheap helpers. The school must recognize these conflicting institutional views but they should not accept them as basic directives for curriculum planning.[25]

Byrne's point is that technical educators should not interpret the demands from conflicting groups as curriculum directives. To obtain a balance between the demands from the two groups, provision is often made for students in one kind of program to select options from the other kind. Some educators go further and compel students to select options from the other kind of program. It is anticipated that the Alberta College System will encourage the first of these two approaches. Fast articulates a somewhat softer position:

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[25]Byrne, op. cit., p. 7.

> . . . provision should be made for students in the technical and engineering fields to pursue other interests such as those in the cultural, social, humanities and fine arts fields. The opposite should also hold.[26]

Neither the junior college nor technical institute programs in Alberta have a well developed system of options. In contrast with this, the colleges of agriculture have given attention to broadening their programs. The several agricultural technologies have optional subjects which are, in general, agricultural specialties with the general education content specified among the compulsory subjects. Horticultural Technology and Fashion and Design Technology do not have optional subjects, but both Agri-Business and Irrigation Technology indicate optional subjects, some of which could be considered general education.[27]

The matter of options is part of a large problem which has involved much of the material discussed to this point, that is, the place of general education in technical programs.

General Education in Technical Programs

The school system is sometimes said to be operated as if the world of work did not exist. By the opposite token, technical institutes may design programs as if the humanities and social sciences did not exist. This compartmentation of education into closed systems is what Snow implies by his two cultures (*supra* p. 21).

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[26] Fast, *op. cit.*, p. 6.

[27] Alberta Agricultural and Vocational Colleges, *Calendar 1968-69 Alberta Agricultural and Vocational Colleges* (Edmonton: The Queen's Printer, 1968), pp. 26-52.

Most technical educators give at least lip-service to the valid place for general studies in their programs and some go further and include a substantial component. One force which in the past has tended to reduce the general education content of both vocational and technical education programs was the requirement in the Technical and Vocational Training Agreement that subsidized programs not be designed for university credit. The act supporting this agreement was repealed in the spring of 1967 and the two acts replacing it take a more liberal view of the suitability of general studies, as well as providing for a cost-sharing by the federal government in post-secondary education. These changes have resulted in the increased involvement of junior colleges in technical programming in Alberta. Graney states the problem for technical program developers:

> One must be on guard not to sacrifice some technical subject matter to make way for nontechnical courses and in so doing graduate individuals who are deficient in technical competence. Similarly, one must not go in the other direction and train technicians devoid of all formal instruction not tightly related to their work. Between these two horns of the dilemma, the technical institute educator struggles with the frustration imposed by an insoluble problem.[28]

This statement reads as if the technical educator was the sole controller of programs, and he may be most influential in this activity, but students also direct programming by the collective effect of their responses. Emerson states this aspect bluntly:

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[28]Graney, _op. cit._, p. 58.

"If too much general education is included, students will not enrol."[29] In spite of this known reluctance of students to enrol in technical programs with a substantial general education content, the importance of its inclusion is indicated in a report on programming at the Southern Alberta Institute of Technology which recommended that:

> General education should be increasingly emphasized through the enrichment of the student activity and through the introduction of general course content in vocational programs.
>
> . . . recognizing, of course, that such a step might result in an increase in the length of program.[30]

This statement appears to contain the notion that the general courses should be compulsory rather than optional. In Ontario, complete programs are proposed with a general orientation:

> To meet the needs of what is possibly a very large number of adults, who, for various reasons, have failed to complete their formal education, there should be, in a College of Applied Arts and Technology, a liberal arts program. It is hoped that this program would be of a calibre that might meet the requirements for university entrance: . . .[31]

It appears that this Ontario based program would be non-technical and, therefore, there is no particular implication that general studies would become a compulsory part of the technical program.

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[29] Emerson, op. cit., p. 94.

[30] The Minister's Select Committee, op. cit., p. 18.

[31] The Ontario Department of Education, op. cit., p. 37.

Garrow[32] states that in British Columbia the farm-oriented agricultural program has been discontinued and replaced by agricultural programs at the technical institute. He comments on the reaction to a similar kind of situation in Alberta:

> By contrast, in Alberta, the diploma program is still offered at the agricultural colleges where the farm boy and girl continue to be trained in isolation from the main stream of educational opportunity. A few limited programs for technicians are being offered but are entirely inadequate to meet the demands of the future. . . . The agricultural colleges with their low enrolment have proven to be an extremely expensive form of education.[33]

The implication for general education here is that this is just what students in these colleges tend not to obtain when they are trained in an environment different from the urban one where many must go for employment. Garrow also notes the trend for agricultural education to be placed under the authority of the Departments of Education rather than the Departments of Agriculture and that this has happened in all of the four western provinces except Alberta.[34] It might be assumed that the Departments of Education would be biased in the direction of general education as compared with the more special interests of Departments of Agriculture. The similar pattern of transferring authority for technical programs to educational authorities is also apparent in Europe.

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[32]P. Garrow, _Agricultural Education in Canada_ (Calgary: The Department of Educational Administration, The University of Calgary, 1968), p. 109.

[33]_Ibid._

[34]_Ibid._, p. 110.

Gregoire states that in Europe technical and vocational education was traditionally controlled by Departments of Commerce or Departments of Labour where "the links between vocational and general education were very tenuous."[35] In North America there is a substantial pressure for general education elements in technical programs but not for general programs to contain technical education elements. In Europe the value of a technical componant in programs for general studies is more accepted and Gregoire[36] points out that this is not a recent development by recalling the values of Jean-Jacques Rousseau related to training in the manual arts.

Harris gives a philosophy for, but avoids assigning priorities to the conflicting demands of, technical and general education:

> The "liberal arts" as envisioned by Cicero-- the studies of free and leisured man -- may have been proper educational fare when only the free man had the leisure to think, plan, lead, and govern; and when the other 95 per cent worked almost, if not quite, as slaves. Today, in America, in a society where all men are free and where almost all men work; where those with the greatest amount of education work the most, and where the best guarantee of leisure is a lack of education; where pastoral pursuits and a rigid class society have given way to a highly scientific, technological, and industrialized society with great horizontal and vertical mobility among classes -- the liberal arts curriculum as a standard for all higher education leaves much to be desired.
>
> By the opposite token, though we live in a technological society, man himself is not a machine. If higher education holds out hope for the personality and individuality of man,

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[35]Roger Gregoire, Vocational Education (Paris: Organization for Economic Co-operation and Development, 1967), p. 34.

[36]Ibid., p. 35.

> and I think it does, then all educational programs must incorporate some degree of confrontation between students and ideas men have produced and nurtured through the centuries. Contemplation, I am convinced, is good for everybody -- it should not be an exercise reserved for the elite few. . . .[37]

It is difficult to disagree with Harris' position; however, it is one thing not to reserve general education for the "elite few", and quite another to force it on the multitude.

The continuous attempt by academics to impose general education into technical programs no doubt has other bases than the equalitarian basis of Harris. It might be hypothesized (and hopefully this notion will be investigated) that two mental-sets operate in <u>this</u> regard. The mental-set of the technician, and by implication those who choose technician programs, is based on the need for answers to questions posed by others. The mental-set of the generalist is based on the need to question. It might be supposed that the two needs would complement each other and the technician and the generalist would be comfortable each in the company of the other. This is not typically the case. The generalist, while he poses questions, does not necessarily want answers -- just better questions. The technician becomes uncomfortable in this open-ended environment. His approach is to so concentrate his effort in a narrow field that answers become possible for him. Since few individual students have an orientation

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[37]Norman C. Harris, "Curriculum and Instruction in Occupational Education," <u>Emphasis: Occupational Education in the Two-Year College</u> (Washington, D. C.: American Association of Junior Colleges, 1966), pp. 48-49.

to the extremes of the specialist-generalist continuum, a minimum requirement might be to permit students in either kind of program to take courses in the other kind. A more prescriptive approach is to require that students in one kind of program take courses in the other.

A Curriculum Analysis System

There was little reference in the literature to systems for curriculum analysis of technical programs. Obvious dimensions such as length of program, level of program, the location of the campus, and the employment goal of graduates may have been assumed to be sufficiently defined by the name of the institution offering the program. Thus the term "teachers' college" may be assumed to provide information relating to all of the dimensions given above by way of example. Because technical programs tend to be housed in institutions offering many technologies, additional information relating to individual curricula becomes desirable.

The curriculum analysis scheme stated by French and reported by Ford most nearly fits the Alberta pattern:

> [French] suggests that five elements make up post-secondary education programs: technical education (theory), technical education (practical), technology (theory), technology (practical) and general education. Technical education (theory) refers to background subjects such as mathematics, physics, chemistry and engineering drawing. These subjects will help the student understand his major subjects. Technical education (practical) refers to the laboratory work which is related to the theory subjects. Technology (theory) refers to the theory behind the equipment and skills which the student must learn to use.

> Technology (practical) refers to the actual skills which the student must learn. . . . General education refers to general background subjects such as oral and written communication, industrial sociology, economics, literature and cultural activities. French suggests that between ten and twenty per cent of the time should be devoted to general education.[38]

Enrolment Policies in Technical Education

A separate aspect of technical education concerns enrolment policies. The response of the Minister of Education for Ontario to the likely demand for post-secondary education there may well indicate the scope of the future demand in Alberta for post-secondary but non-university programs.

> I experienced a considerable sense of shock when during our recent visit to California to study these and related matters, we were informed quite casually and as an accepted fact of life, that employers in that jurisdiction weren't really willing to accept high school graduation as a minimum qualification for new employees, but were demanding graduation from a junior college as the irreducible minimum.[39]

Fast studied the demand for college places in Alberta and concluded:

> . . . the present facilities of the colleges, technical institutes, and agricultural colleges are designed to accommodate approximately 10,500 full-time students -- the

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[38] Donald W. Ford, College Programs (A) (Edmonton: The Provincial Board of Post-Secondary Education, 1968), p. 12, from: H.W. French, "Types, Content and Organization of Courses" in Commonwealth Education Liaison Committee, Education and Training of Technicians (London: Her Majesty's Stationery Office, 1967), pp. 61-63.

[39] The Ontario Department of Education, op. cit., p. 9. This is an excerpt from a speech to the Ontario Legislature on May 21, 1965.

> actual number presently [1967-68] enrolled. However, by 1972 it is expected that there will be approximately 29,531 students seeking accommodation in the College System.[40]

The relevance of these two statements to this study is that technical programs require development and co-ordination since, in most cases, there is not an employment market for a three-fold increase in the number of graduates in the traditional technologies.

The Alberta Institutes of Technology appear to be attempting to soften their entrance requirements. No general statement of policy has been made; however, an examination of their calendars shows that restrictive entrance requirements reached a peak at the end of the Technical and Vocational Training Agreement in 1967. The intent at institutes appears to be a spectrum of entrance requirements so that a potential student is not refused admission. The programs available now depend on the student's educational record, or, willingness to undertake pre-technology studies. The following calendar statement precedes the outline of a pre-technology program:

> Over the past years many adults have been kept from entering the Northern Alberta Institute of Technology because they lacked the necessary entrance requirements. Many of these people had extensive backgrounds but were lacking in the areas of Mathematics, Physics, English and/or Chemistry.[41]

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[40]Fast, op. cit., 1968, p. 26.

[41]The Northern Alberta Institute of Technology, Calendar 1969-70 (Edmonton: The Queen's Printer, 1969), p. 32.

The Agricultural and Vocational College administrators take a more liberal view toward who should be admitted:

> . . . the colleges must maintain an open-door policy with regard to admission; that is, they must provide programs for all levels of individuals. In short, the admission policy of the colleges should be premised on this approach: How do we get students into the course of study they want to follow; not; How do we screen out all those who do not meet some arbitrary admission standard we have set?[42]

This is admittedly a statement of intent (author's emphasis), rather than a statement of fact. It indicates a willingness to admit students on their terms.

The two largest junior colleges in Alberta take the following approach to admission in their technical programs. One college includes this in its statement of objectives:

> As a community college, Mount Royal Junior College seeks to provide educational opportunities for any individual who possesses a High School Diploma or has reached the age of eighteen.[43]

However, some programs, for example the Nursing[44] program, have particular academic entrance requirements, and other social science-related programs have an admissions committee and testing procedures.[45]

A second college includes this statement in their calendar:

> Admission under Adult Privileges applies to any program and is outlined as follows:

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[42] W.J. Collin, Monthly Notes (Edmonton: The Department of Agriculture, January 1969), p. 7.

[43] Mount Royal Junior College, Calendar 1969-70, p. 9.

[44] Ibid., pp. 41-42.

[45] Ibid., p.37, pp. 43-44.

> Adult Privilege: Upon recommendation of the College Counselling Department, an adult student (minimum age eighteen years) may be admitted without the stated academic entrance requirements. . . .[46]

In summary, entrance to programs in the college system tends to be restricted by entrance requirements at the institutes of technology, students are admitted to junior colleges but not necessarily to the program of their choice, and, students should be admitted to programs they wish to take at colleges of agriculture. Another approach to admissions, the manpower approach, is to take the view that employment must be available to graduates and, therefore, enrolment should depend on potential manpower requirements.

The Manpower Approach to Enrolment

Harris gives the following guidelines in determining the local manpower needs based on surveys:

1. Such surveys should have a carefully developed research design and should be staffed by professionals who understand the methods to be pursued and the pitfalls to be avoided.

2. Advisory committees of informed lay citizens should be a part of every such survey. Such committees should be comprised of persons at several levels of responsibility -- not just vice-presidents, owners, and managers.

3. The requirements for employees in entry jobs should be determined and the specific knowledge and skills required should be ascertained.

4. A definite attempt should be made to find out the level of general education, or the common learnings, required for success and promotion on the job.

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[46] Lethbridge Junior College, Calendar 1968-69, p. 13.

5. Not only must potential jobs be identified but the number of qualified students interested in specific educational programs must be accurately estimated.[47]

The list above might seem to imply that manpower needs dictate the number of student places provided but this is not necessarily the case, since technical education output would then depend on the level of economic activity and a slowdown in economic activity would imply a restricted enrolment when increased enrolment would be more socially useful. What the manpower approach does imply is that the numbers of students and the technical specialties provided are both in proportion to the employment potential of the community. The Public Expenditure and Revenue Study Committee in Alberta made the following observation in their report:

> In view of the relative scarcity of trained medical and dental personnel and the difficulty of expanding this supply in the short run, ways should be sought of training and using, under supervision, large numbers of assistants and auxiliaries. The facilities of technical schools and junior colleges might well be used for this purpose.[48]

The technical institutes have expanded their paramedical programs since this report was published and two-year nursing programs have been started in three junior colleges. An interesting sidelight on the result of these developments is the low starting

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[47]Harris, "Curriculum and Instruction in Occupational Education," Emphasis: Occupational Education in the Two-Year College (Washington, D. C.: American Association of Junior Colleges, 1966), pp. 43-44.

[48]The Public Expenditure and Revenue Study Committee (Edmonton: The Queen's Printer, 1966), p. 45.

salaries being given to Dental Assistants graduating from the one-year program. In 1968 the starting salary for other technician graduates tended to be in the range from four to five hundred dollars monthly. The dental assistants were well below the secretarial graduates, ranging from $240 to $319 per month, and just above the office machine mechanics[49] who require grade ten or equivalent for entrance to their program. Dentists, who are among the most highly remunerated professionals, apparently pay low technical salaries. This using of auxiliaries can hardly be what the committee intended by their recommendation and this is not generally the motivation behind the manpower approach.

The Tremblay Committee, a sub-group of the Parent Royal Commission for Quebec, noted that the manpower approach required softening and they state:

> . . . in a democratic society based on respect for human rights the numerical balance sought between the "output" of trade schools and the labour market is a target which must be aimed at with due respect to the individual's right to a free choice of career. . .[50]

Not only is manpower forecasting an uncertain art, but possibly it is well that it remain uncertain since this tends to check state career assigning activity by personnel in state operated

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[49]The Department of Education, Sixty Third Annual Report of the Department of Education of the Province of Alberta 1968 (Edmonton: The Queen's Printer, 1969), p. 102.

[50]Gregoire, op. cit., p. 115. From the Report by the Committee for Research on Technical and Vocational Education, Summary of Principal Findings and Recommendations (Quebec: The Queen's Printer 1962), p. 32.

institutions. A frequent practice in Canada is to copy the policies devised for similar problems in the United States. This is particularly the case for manpower since the relatively free flow of trained manpower to and from the United States tends to produce a common pool of potential employees for the two nations at the technical and professional levels. Gregoire notes that nations of different sizes have requirements which are size dependent and this, in turn, suggests that Canadians would be wise not to copy manpower policies blindly:

> . . . vocational education given at school is better suited to small countries such as Belgium, the Netherlands and Sweden, where industry, however technically developed, cannot be highly diversified; and that on the contrary, in-firm training is better suited to the needs of larger countries such as Germany or the United Kingdom where production is much more diversified.[51]

Canada is a small nation compared to the United States and, with our well defined regionalisms within Canada, Alberta becomes the equivalent of a very small nation as concerns manpower development. The implication from Gregoire is that a province the economic size of Alberta should institutionalize technical education and achieve a highly specialized technical system.

Technical Education and Research Activity

Up to this point a number of questions have been raised. In some cases, opinion on these questions is available from the

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[51] Gregoire, *Ibid.*, p. 33.

literature; however, there is a striking lack of research findings relating to this kind of education. The question arises: why, when governments are investing heavily in this kind of education, is a corresponding research investment not being made? The simple fact is that research, supported on an institutional level and scale, is not being done.

In Alberta, just one study was funded under Program Ten of the Technical and Vocational Training Agreement, which was instituted to provide economic support to research activity, for the total time the Agreement was in force. This was the Fair Study[52] involving something under twelve thousand dollars.[53] One reason for the lack of research activity is that there is not a Department of Technical Education in a Canadian university where research activity might be based. Even in the United States, where these departments exist on some campuses, little research is carried on that is not superficial. Emerson makes the following comment:

> Technical Educators have shied away from really tough research jobs which demand a great deal of time, energy and reflective thinking. Few persons in the field of technical education are truly research minded, and have the time and resources for extended research projects.[54]

He also indicates the kinds of questions that might be investigated:

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[52] Donald C. Fair, "Vocational Plans of Alberta Youth" (paper read at the Conference on Post-Secondary and Continuing Education, University of Alberta, Edmonton, November, 1966), pp. 1-25.

[53] *Ibid.*

[54] Emerson, *op. cit.*, p. 114.

> . . . Little attention has been given to basic research in the sciences and other disciplines which underlie technical education, and their influence and impact on this field. Little has been done on the psychology of learning technical skills, motivation in learning situations, how desirable work habits may be developed, critical aspects of instructional materials that affect learning, and the like. There has been little experimental research under controlled conditions.[55]

A recent review of program research by Coster _et al_. notes the kind of research that is typically done:

> Perhaps the most widely used research procedure is to submit a list of objectives to a panel of experts with requests to evaluate the objectives in terms of their appropriateness to contemporary needs in vocational, technical, and practical arts education. Value judgements, therefore, have weighed heavily in the assessment of the objectives, and when value judgements have been qualified, the resultant appraisals have been confounded with the frame of reference or educational and occupational background of the jury.[56]

This was the procedure adopted by Williams[57] in his recent study of the goals of the Chemical Technology program. Coster _et al_. also notes the large number of descriptive and follow-up studies, and while he does not "deprecate the value of descriptive studies . . . [he does] argue for increased attention to explanatory studies."[58] He notes a particular shortage of studies at the post-secondary level.

Alberta Based Studies

Four Alberta studies have relevance to this investigation in

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[55] _Ibid_., p. 112.

[56] John K. Coster and Loren A. Ihnen, "Program Evaluation", _Review of Educational Research_, XXXVIII:4 (October, 1968), p. 419.

[57] Williams, _op_. _cit_., p. 3.

[58] Coster, _op_. _cit_., pp. 417-33.

that they provide background and setting. Simon[59] traces the history of the Southern Alberta Institute of Technology, then designated the Provincial Institute of Technology and Art, from its beginning as a trade school in temporary quarters in 1916 to its present trade-polytechnical status. Fair[60] has accumulated statistics and read papers relating to the expectations of Alberta youth. Karpoff[61] studied the problem of predicting success of students in one Alberta vocational high school, and Williams[62] investigated the goals of the Chemical Technology program at the Northern Alberta Institute of Technology.

This chapter has dealt with ideas about: (1) the purposes and philosophies of technical education, and in particular, about the concern for a general education component in the curriculum, (2) the characteristics of technical programs housed in technical institutes, agricultural colleges, and community colleges, (3) whether enrolment policies should be guided by student interests, employer interests, or manpower planning, and (4) recent research.

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[59]Frank Simon, "History of the Alberta Provincial Institute of Technology and Art" (unpublished Master's thesis, The University of Alberta, Edmonton, 1962), pp. 1-351.

[60]Fair, _op_. _cit_.

[61]John T. Karpoff, "Aptitudes for Achievement in Vocational Programs of One Composite High School in Alberta" (unpublished Master's thesis, The University of Alberta, Edmonton, 1967), pp. 1-105.

[62]John C. Williams, "Goals in Technical Education" (unpublished Master's thesis, The University of Alberta, Edmonton, 1967), pp. 1-132.

CHAPTER III

THE SETTING AND THE METHODOLOGY

I. CHARACTERISTICS OF THE INSTITUTIONS

This section provides background information on the three categories of institutions whose technical programs were considered in this study: the public junior colleges, the colleges of agriculture, and the institutes of technology. Several technical level programs excluded from the study were offered by authorities other than these, mainly, but not exclusively in the paramedical area by the provincial Department of Health or the publicly supported hospitals.

The Agricultural and Vocational Colleges

The Agricultural and Vocational Colleges were established in 1913, however, they have used this name only since 1962 when the program offerings were broadened to include education and training not specifically related to agriculture. The three colleges are at Olds, Fairview and Vermilion. All three colleges are residential and offer certain high school subjects in addition to their regular programs. Within programs students have considerable opportunity to select majors and electives to enrich and broaden the programs. Both instructors and administrators are civil servants and the services of other government departments are used for institutional purposes.

The Department of Public Works provides both capital projects and maintenance; the Department of Personnel provides for recruitment and other staff services and the Treasury Department provides budgetary and financial services. Instruction is organized into sessions with most students attending for the fall and winter session; however, the spring session is growing in popularity and some programs are offered in a summer session.

The Technical Institutes

There are two technical institutes, one in Edmonton and one in Calgary. The Southern Alberta Institute of Technology in Calgary dates from 1916 and has evolved from a trade level institution at that time into its present polytechnical role. There are approximately twenty-five hundred regular day students. Most students are enrolled in two-year programs, there are a number of three-year programs, there are very few one-year programs, and The Alberta College of Art, a division of the institute, offers four-year programs. The same campus is used to provide six to twelve-week academic programs to several thousand apprentices yearly and the extension division offers evening courses and programs to adults from the community. More than half of the students in regular day attendance are enrolled in programs designated "technical programs" for the purpose of this study. Some departments are organized for instruction on a yearly basis while others are organized on a quarterly basis with most students attending for three of the quarters yearly. Only a few programs are currently offered in the summer quarter.

The Northern Alberta Institute of Technology in Edmonton is larger in terms of enrolment than its southern counterpart with approximately three thousand regular day students in attendance. There is no department equivalent to The Alberta College of Art in Calgary. Programs based on business, commerce and the social sciences are more developed. This institute dates from 1962 and was built with substantial financial assistance from the federal government under the provisions of the Technical and Vocational Training Agreement. Consequently, the physical plant is more elaborate than that of the older institute in Calgary. Instruction has been organized on the quarter system from the beginning. Apprentice and extension division training is organized in a similar way in the two institutes.

Both institutes are operated under the Department of Education as part of the Division of Vocational Education in a manner similar to that in which the agricultural colleges come under the Department of Agriculture.

The Public Junior Colleges

The five public junior[1] colleges in Alberta are in Medicine Hat, Lethbridge, Calgary, Red Deer, and Grande Prairie. All of these

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[1]The Alberta Colleges Act, passed by the Alberta legislature early in 1969 effects the removal of the word "junior" in college names. Since the designation junior was used when the data was gathered, it is retained in this study. This Act also abolished the Provincial Board of Post-Secondary Education and established the Provincial Colleges Commission.

colleges except Lethbridge Junior College and Mount Royal Junior College in Calgary are newly established. Even the largest junior colleges presently have enrolments in the hundreds. Financing is largely from the provincial government on a per student basis supplemented by modest fees. Approval for offering new programs is required from the Provincial Colleges Commission.

The Alberta College System

The five junior colleges, the three colleges of agriculture, and the two institutes of technology have been designated the Alberta College System by the Government of Alberta.[2] At present, only the junior colleges come under the authority of the Provincial Colleges Commission.

It is possible that all the elements in the system will eventually be placed under the direct authority of this Commission.

II. THE QUESTIONNAIRE

This section indicates the content in the four conceptual areas that comprise the questionnaire and the stages in its development.

Categories of Questions in The Questionnaire

There were four categories of questions in the questionnaire

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[2]Henry Kolesar, "Post-Secondary Education in Alberta: Toward the Development of a System" (paper read at the Alberta School Trustees' Association Meeting, Calgary, November 4 and 5, 1968), p. 8.

used: (1) questions designed to produce gross statistics about programs including, for example, length in weeks, enrolment, and entrance requirements; (2) a multi-part question on the methodologies employed and the per cent of time for each methodology; (3) a multi-part question intended to elicit information on curriculum organizations; (4) a question where the program supervisor might indicate his conception of the employment role for graduates.

Statistical Questions

For each program identified, specific answers were sought to the following questions:

1. How was the program identified? This included program name, department and institutions offering the program.
2. How many years were required to complete the program?
3. What was the approximate number of weeks each year that the program was under instruction?
4. For how many years before 1968 was the program offered?
5. Were there optional components to this program, and, if so, what were they?
6. What were the entrance requirements?
7. How many students commenced each year of the program in the fall of 1968?
8. How many students was the registrar authorized to accept for each year of the program in the fall of 1968?
9. How many hours per week were scheduled for instruction in each year of the program in the 1968-69 academic year?

Question on Methodology

For the program identified, what methodologies were employed for each year of the program and for what per cent of instructional time was each used?

Question on Curriculum Elements

If instructional activity was assigned to the five curricular elements indicated in the questionnaire, what percentage of the instructional time was given to each?

Question on The Role of The Graduate

Were graduates being prepared for the role of assisting a professional, for working without professional supervision in a job, or for an intermediate role.

The Development and Testing of the Questionnaire

A preliminary form of the questionnaire was developed and assessed by colleagues who were also given an explanation of the intent of the questions. Appropriate changes were then made.

Six program supervisors at the Northern Alberta Institute of Technology agreed to complete this form of the questionnaire for their program and then make comments on the appropriateness of the questions, in their opinion, and draw attention to ambiguities. Five of the supervisors actually completed this stage and made both written and verbal comments. These suggestions resulted in having questions thirteen and fourteen, on methodology and curriculum elements respectively, arranged so that they might be answered

differently for each year of the program. The last question which formerly related to the calendar description of the program was thought to be non-significant and was replaced by a question on the perceived role of the graduate. The questionnaire was not changed after this.

Instructions and Explanation Accompanying the Questionnaire

Each program supervisor received the five page package shown in Appendix A. The last three pages of the package constituted the questionnaire proper and the first two pages, in letter form, gave explanation, certain definitions, and instructions. The purpose of the letter was to promote completion of the form but to avoid indicating what kinds of answers were expected.

III. THE IDENTIFICATION OF TECHNICAL PROGRAMS

The following material describes the method used to define and identify technical programs. Certain terms were defined and then administrators were asked to decide which of their programs, if any, came within the definition of "technical programs".

Definition of Terms

Academic Year. Academic year refers to the major part of the interval between successive summer vacation periods regardless of any further subdivision into quarters or semesters.

First Year. First year refers to the beginning year in a program including Year "A" of the articulated technologies but excluding a pre-technology year.

Program. Program includes all the subjects that a particular student would take, including options, to qualify for a particular certificate or diploma.

Technical Program. Technical program for this study means a program offered by a public junior college, a college of agriculture, or an institute of technology that is from one to three years long, that is based on one of the non-social sciences or mathematics, and that is directed toward a specific employment area or role.

Delimitations of Programs Considered

The definition of "technical program" given above not only excludes many of the programs offered by the institutions constituting The Alberta College System but it excludes programs offered by other organizations that might be considered technical if offered by an institution within the system. These exclusions eliminate from consideration programs offered by organizations such as: (1) hospitals and mental institutions providing training to nurses and technicians, (2) correctional institutions, (3) extension departments of educational institutions, (4) The Workmen's Compensation Board, (5) departments of the federal government providing training to Indians and Eskimos, and (6) private schools and colleges.

Programs within the three categories of institution were excluded if, in the opinion of their administrators, they were not based on mathematics or science. Since these decisions were made on an institutional basis, the pattern in one institution is not

necessarily consistent with the pattern in another. By way of example, the Business Administration program was considered to be a technical program in some institutions but not in others.

IV. THE ADMINISTRATION OF THE QUESTIONNAIRE

Contact With Senior Educational Administrators

The senior administrators in Edmonton for each category of institution were contacted early in the project for two main purposes. First, it was necessary to obtain their permission to carry on the study, and second, it was anticipated that they might wish to indicate certain areas for study. This last activity did not occur.

Contact With Presidents and Principals

A letter was written to each president or principal requesting his cooperation and assistance. All letters were not identical owing to institutional and organizational differences; however, the letter included in Appendix B is characteristic. The letters asked for assistance at two stages. First, assistance was required to identify which of the programs, if any, were technical, and second, assistance was required to have the questionnaires distributed to the program supervisors of the programs identified as being technical. In some cases, the president or principal designated a staff member to carry out the two functions requested.

The Extent of the Response to the Questionniare

Responses were received on behalf of all the institutions in the Alberta College System. Except for two junior colleges, all institutions reported technical programs and completed questionnaires were returned. Appendix C provides coded data.

Of the total of sixty-seven programs reported, forty-nine were based in institutes of technology, eleven were based in agricultural colleges and seven were based in public junior colleges. Since the programs in agricultural colleges tend to be duplicated from one college to another, the sample obtained may be representative of their activities. A similar situation exists with respect to the technical institutes since only a few programs were not represented. The situation is somewhat different for the junior colleges. Of the seven programs reported, three were the first year of articulated technologies which duplicate programs offered in vocational high schools and technical institutes and of the remaining four, two were business related programs, one was a nursing program, and one was the first year of a Commercial Cooking program. One of the business related programs had just one student. It is prudent to suspect that the evidence in this study does not indicate the extent of the activity of junior colleges in technical education.

V. THE TREATMENT OF THE DATA

The data for each program were put on a computer punch card. A standard computer program was used to calculate means, standard

deviations, and product-moment correlations betweens pairs of variables. This was done for (1) technical institutes, (2) agricultural colleges, (3) public junior colleges, and (4) the college system. These data were also processed to count the number of non-zero responses and calculate a new mean for the non-zero responses. For example, only nine of the sixty-seven first year programs reported used at least one per cent of the instructional time for Individualized Instructional Aides. The mean per cent of the instructional time for this method, based on sixty-seven programs, was 0.43 per cent; however, for the nine programs that reported using this method, the mean per cent was 3.2, a figure with a different meaning. Both figures are given when the difference is substantial.

CHAPTER IV

RESULTS

This chapter gives the results obtained from processing data obtained from the responses to the questionnaire. In addition to data, comment is made on certain correlation coefficients, regarded here as descriptive statistics,[1] where the probability of a chance occurrence of the correlation was less than .05 for any of the categories of institutions or the college system. In many instances comment could be expanded by stating the converse of the comment made. The pattern in the following material is to avoid stating the converse unless it strengthens the suggestion made. Results are grouped into four sections: (1) program statistics, (2) methodologies, (3)curriculum elements, and (4) the role of the graduate.

I. PROGRAM STATISTICS

Program Length in Years

Table I displays data on the program length in years. There were sixteen three-year programs and three one-year programs. The mean program length for the college system was 2.19 years, ranging from a low of 1.91 years in agricultural colleges to a high of 2.57

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[1]Correlation coefficients used in this study are intended to provide description rather than imply causality. Ferguson distinguishes between correlation and prediction in this regard. George Ferguson, Statistical Analysis in Psychology and Education (second edition; New York: McGraw-Hill Book Company, 1966), p. 105.

TABLE I

LENGTHS OF PROGRAMS IN YEARS AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Years Per Program	2.20	1.91	2.57	2.19
Standard Deviation	0.494	0.287	0.495	0.496
Paired With Variable	Correlation Coefficients			
Years Offered (III)[a]	-0.142	0.037	0.958[b]	-0.118
Entrance Requirements (V)	-0.344	-0.149	-0.900	-0.249
Enrolment First Year (VI)	0.320	-0.103	-0.297	0.238
Hours Per Week (VIII)	0.154	-0.195	0.907	0.159
Student Participation First Year (XX)	-0.032	-0.381	-0.810	-0.112
Technical Education (Theory) First Year (XXVII)	0.296	-0.296	-0.075	0.132
Technology (Theory) Last Year (XXXII)	0.353	0.0	0.0	0.228

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

years in junior colleges.

The correlation coefficient of 0.958 for junior colleges, between the number of years the program has been offered and the program length, suggests that these colleges offer relatively long programs that have been recently established.

The correlation of -0.344 for institutes between program length and the entrance requirements code, where a small number indicated low entrance requirements, suggests that long programs had relatively low entrance requirements and short programs had relatively high entrance requirements. The recently established three-year articulated technologies with relatively low entrance requirements may have contributed substantially to the magnitude of this statistic.

The correlation coefficient of 0.907 for junior colleges, between program length in years and the number of hours of instruction per week, suggests that longer programs had more hours of instruction weekly.

The correlation coefficient of -0.810 for junior colleges, between length of program in years and the per cent of time for Student Participation in the first year, suggests that the shorter programs in terms of years had more Student Participation in instruction than did the longer programs.

The correlation of 0.296 for institutes, between length of program in years and the per cent of Technical Education (Theory) in the first year curriculum, implies that the longer programs gave

a greater per cent of curriculum time to Technical Education (Theory) than was the case for shorter programs.

The correlation of 0.353 for institutes, between program length in years and the per cent of Technology (Theory) in the last year curriculum, suggests that shorter programs minimized Technology (Theory) in the last year and that longer programs tended to emphasize it.

Number of Weeks Per Year Program in Session

The mean number of weeks per year that programs were offered for the college system was 32.77. This and other statistics relating to the duration of the year are shown in Table II. There was only a slight variation in the mean number of weeks in one category of institution and another ranging from a low of 29.09 weeks in agricultural colleges to a high of 33.67 weeks in technical institutes. The standard deviation of this statistic ranged from a low of 1.66 in junior colleges to a high of 7.82 in agricultural colleges with technical institutes having an intermediate figure of 3.19. This implies that the length of year was quite variable in agricultural colleges. This might be explained by some supervisors interpretting the year to be two sessions and others using three.

The correlation of -0.388 for institutes, between the number of weeks per year and the number of years the program has been offered, implies that the programs established many years ago tended to have a short year in comparison to the programs more recently established.

TABLE II

NUMBER OF WEEKS PER YEAR THE PROGRAM WAS IN SESSION AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Number of Weeks	33.67	29.09	32.29	32.78
Standard Deviation	3.19	7.82	1.66	4.54
Paired With Variable	Correlation Coefficients			
Years Offered (III)[a]	-0.388[b]	0.423	-0.190	-0.068
Options (IV)	-0.243	-0.039	0.777	-0.174
Enrolment Last Year (VIII)	0.365	0.882	0.0	0.401
Lecture-Demonstration First Year (X)	0.035	0.296	-0.821	0.077
Work Experience Last Year (XVII)	0.425	0.173	1.000	0.327
Technology (Theory) First Year (XXXI)	0.388	-0.326	-0.182	-0.028
Technology (Theory) Last Year (XXXII)	-0.222	-0.344	-1.000	-0.287
Technology (Practical) Last Year (XXXIV)	0.330	-0.463	-1.000	0.294
General Education First Year (XXXV)	-0.015	0.655	0.482	0.144
Role of the Graduate (XXXVII)	-0.323	0.504	0.445	-0.057

[a] Refers to table number

[b] Underlined coefficient, probability less than .05

A factor tending to increase the magnitude of this statistic was the recent establishment of the three-year articulated technologies.

The correlation of 0.777 for junior colleges, between the number of weeks per year the program was in session and the code for options, suggests that there was a more liberal provision for options in the programs having more weeks in session yearly.

The correlations of 0.365 for institutes, 0.882 for agricultural colleges, and 0.401 for the college system, between the number of weeks per year and the last year enrolment, suggest that enrolment tended to be higher when the instructional year was longer, or conversely short programs tended to have low enrolment.

The correlation of -0.821 for agricultural colleges, between the length of year in weeks and the per cent of time for Lecture-Demonstration in the curriculum of the first year, suggests that for agricultural colleges the longer the year was the less Lecture-Demonstration tended to be used in the program.

The correlations of 0.425 for institutes and 0.327 for the college system, between the number of weeks the program was in session and the per cent of Work Experience in the last year, suggest that a lesser per cent of time for Work Experience was provided in the shorter programs.

The correlation of 0.388 for institutes, between the number of weeks the program was in session yearly and the per cent of the curriculum time for Technology (Theory) in the first year, implies the possibility that Technology (Theory) was assigned a greater proportion

of time in the curriculum when the year was longer. The correlation between this curriculum element in the last year and the length of year was -0.287 for the college system. This suggests a reversal between whatever was the first year relationship in institutes and the last year relationship for the system. For the system, then, a shortened year implied a greater proportion of time for Technology (Theory) in the curriculum.

The correlations of 0.330 for institutes and 0.294 for the college system, between the number of weeks yearly and the per cent of time for Technology (Practical) in the last year, suggest a direct relationship between length of year and the time proportion that was assigned to Technology (Practical).

The correlation of 0.655 for agricultural colleges, between the length of year in weeks and the per cent of time for General Education in the first year, suggests that General Education was increasingly emphasized as the length of year was increased. The corresponding statistic for institutes was small and negative.

The correlation of -0.323 for institutes, between the length of the year and the role of the graduate, suggests that the programs which occupied a smaller part of the year tended to be job-oriented and the longer programs tended to support the role of orientation to a profession.

Number of Years the Program Has Been Offered

Table III displays statistics on the number of years programs

TABLE III

NUMBER OF YEARS PROGRAM HAS BEEN OFFERED AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Years Offered	8.92	7.40	2.43	8.00
Standard Deviation	12.26	12.76	2.19	11.87
Paired With Variable	Correlation Coefficients			
Length in Years (I)[a]	-0.142	0.037	0.958[b]	-0.118
Weeks Per Year (II)	-0.388	0.423	-0.190	-0.068
Entrance Requirements (V)	-0.333	-0.153	-0.893	-0.253
Enrolment Last Year (VII)	-0.103	0.891	0.0	-0.042
Hours Per Week (VIII)	0.014	0.217	0.870	0.120
Shop Last Year (XV)	0.439	0.373	0.0	0.428
Work Experience First Year (XVI)	0.290	0.181	0.045	0.238
Student Participation First Year (XX)	-0.007	-0.200	-0.792	-0.127
Technology (Practical) First Year (XXXIII)	0.321	-0.144	0.401	0.228

[a]Refers to table number

[b]Underlined coefficients, probability less than .05

have been offered. Programs offered for the first time in September of 1968 were coded as having been offered for zero years. Two institute programs have been offered for forty-seven years and two for forty-one years. Another program offered at an agricultural college had been in existence for forty-five years. These five programs had a substantial effect on the mean and standard deviation for the category of institution where they were offered.

The mean number of years programs have been offered for the college system was 8.00 years. The range was from a mean of 2.43 years at junior colleges to 8.92 years at institutes.

The correlations of -0.333 for institutes, -0.893 for junior colleges and -0.253 for the college system, between the number of years the program had been offered and the code for entrance requirements, imply that relatively low entrance requirements were associated with the older established programs and high entrance requirements were associated the the more newly established programs.

The correlation of 0.891 for agricultural colleges, between the number of years the program had been offered and the last year enrolment, suggests that the older programs were more successful at retaining students to the last year.

The correlation of 0.870 for junior colleges, between the number of years the program had been offered and the number of hours of instruction weekly, suggests that the more recently established programs had scheduled more hours of instruction weekly.

The correlations of 0.439 for institutes and 0.428 for the college system, between the number of years the program had been offered and the per cent of instructional time for Shop in the last year, imply that older programs may have utilized Shop instruction more than did the newer ones. A similar kind of association for institutes was indicated by the correlation of 0.290, betwen the number of years the program had been offered and the per cent of time devoted to Work Experience in the first year.

The correlation of -0.792 for junior colleges, between the number of years the program had been offered and the per cent of instructional time using Student Participation in the first year, suggests that more recently established programs tended to use Student Participation as an instructional method to a greater extent than did the older established programs.

The correlation of 0.321 for institutes, between the number of years the program had been offered and the per cent of Technology (Practical) in the first year, hints that older programs tended to emphasize Technology (Practical) in their curriculum.

Options

Table IV displays statistics on the information on options obtained from responses to the questionnaire. The coding for options is given in Appendix D. Briefly, a low number corresponds to a minimal provision for options and a higher number indicates a more liberal provision for options.

TABLE IV

OPTIONS CODE AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Options Code	1.65	2.36	1.86	1.79
Standard Deviation	1.041	1.298	1.355	1.153
Paired With Variable	Correlation Coefficients			
Weeks Per Year (II)[a]	-0.243	-0.039	**0.777**[b]	0.174
Entrance Requirements (V)	0.206	0.231	**0.920**	0.198
Enrolment First Year (VI)	**0.658**	0.084	**0.503**	0.443
Lecture-Demonstration First Year (X)	0.271	**0.608**	-0.587	0.217
Laboratory First Year (XII)	0.172	**-0.728**	0.317	-0.003
Shop First Year (XIV)	**-0.364**	**-0.189**	-0.400	**-0.324**
Work Experience Last Year (XVII)	-0.222	**0.742**	0.0	-0.152
Group Aides Last Year (XIX)	-0.016	**-0.827**	0.0	-0.102
Student Participation First Year (XX)	0.087	-0.008	**0.789**	**0.265**
Individualized Aides First Year (XXII)	-0.138	**0.722**	0.082	0.158
Individualized Aides Last Year (XXIII)	**0.280**	0.661	0.0	**0.360**
General Education First Year (XXXV)	**-0.322**	0.088	0.586	-0.002
Role of the Graduate (XXXVII)	**0.303**	-0.237	0.564	0.254

[a] Refers to table number

[b] Underlined coefficient, probability less than .05

The correlation of 0.920 for junior colleges, between the options code and the entrance requirements code, suggests that relatively high entrance requirements were found in association with a liberal provision for options.

The correlations of 0.658 for institutes and 0.443 for the college system, betwen the options code and first year enrolments, suggest that there was some proportionality between provision of options and high enrolments. This statistic must be interpreted with caution because options tend to be offered only for programs having a large enough enrolment in first year in institutions having optional programs to warrant subdividing for the last year. This practice suggests that programs with a liberal provision for options necessarily had substantial first year enrolments.

The correlation of 0.608 for agricultural colleges, between the options code and the per cent of time for Lecture-Demonstration in the first year, suggests that those programs with a liberal provision for options tended to emphasize the Lecture-Demonstration method. This notion is reinforced when it is noted that there was a correlation of -0.728 for agricultural colleges, between the options code and the per cent of time Laboratory methods were employed.

The correlations of -0.364 for institutes and -0.324 for the college system, between the options code and the per cent of time for Shop instruction in the first year, tend to associate a minimal provision for options with a high per cent of time for Shop instruction.

The correlation of 0.742 for agricultural colleges, between the options code and the per cent of time for Work Experience in the last year, tends to associate liberal options and Work Experience as an instructional method. Agricultural college information also indicated a correlation of -0.827 between the options code and the per cent of time using Group Instructional Aides in the last year.

The correlations of 0.789 for junior colleges and 0.265 for the college system, between the options code and the per cent of time used for Student Participation in first year, suggest that a liberal provision for options tended to be associated with use of Student Participation as an instructional method. The agricultural college data also gave a correlation of 0.722 between options and Individualized Instructional Aides, which was such as to reinforce the notion above.

The correlation of -0.322 for institutes, between the per cent of General Education in the curriculum and options, suggests that more General Education content was associated with liberal options.

The correlations of 0.303 for institutes and 0.254 for the college system, between the options code and the role of the graduate, tend to suggest associating slight provision for options and the role of on-the-job competence, or alternatively, a liberal provison for options tended to occur where the role of the graduate was to provide support to a professional. It is important to note that this support

was to a particular profession, not professions in general.

Entrance Requirements

Table V displays statistics on entrance requirements the coding for which is given in Appendix E. Entrance requirements were highest at institutes and lowest at agricultural colleges.

The correlation of 0.690 for agricultural colleges, between entrance requirements and first year enrolment, suggests that low entrance requirements and low enrolment were associated as well as high enrolment and high entrance requirements in programs.

The correlations of 0.378 for institutes and 0.294 for the college system, between entrance requirements and the per cent of Laboratory instruction in the first year, may indicate that high entrance requirements and a high proportion of curriculum time for Laboratory instruction were connected. The correlations of -0.445 for institutes and -0.397 for the college system, between entrance requirements and the per cent of time for Shop instruction in the first year, suggest a dichotomy between Laboratory and Shop instruction with Laboratory instruction being associated with high entrance requirements and Shop instruction being associated with low entrance requirements. The correlation of -0.280 for the college system, between entrance requirements and Shop instruction in the last year, tends to reinforce the suggestion above.

The correlation of 0.861 for junior colleges, between entrance requirements and the per cent of time for Student Participation in instruction in the first year, tends to imply that high entrance

TABLE V

ENTRANCE REQUIREMENTS CODE AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Entrance Requirements Code	4.75	3.36	4.00	4.45
Standard Deviation	1.506	0.771	1.604	1.519
Paired With Variable	Correlation Coefficients			
Length in Years (I)[a]	-0.344[b]	0.149	-0.900	-0.294
Years Offered (III)	-0.333	-0.153	-0.893	-0.253
Options (IV)	0.206	0.231	0.920	0.198
Enrolment First Year (VI)	-0.102	0.690	0.370	0.056
Laboratory First Year (XII)	0.378	0.019	-0.039	0.294
Shop First Year (XIV)	-0.445	-0.164	-0.394	-0.397
Shop Last Year (XV)	-0.252	-0.229	0.0	-0.280
Student Participation First Year (XX)	-0.061	0.078	0.861	0.091
General Education Last Year (XXXVI)	-0.186	0.739	0.0	-0.077

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

requirements were more probable for programs where a liberal provision for Student Participation in the first year was found.

The correlation of 0.739 for agricultural colleges, between entrance requirements and the per cent of curriculum time for General Education in the last year, tends to suggest that the amount of time for General Education in the last year was proportional to the level of entrance requirements.

First Year Enrolment in Programs

Statistics on first year enrolment are given in Table VI. The relatively high correlation coefficients on 0.534 for institutes, 0.831 for agricultural colleges, and 0.556 for the college system, between first year and last year enrolments are not surprising. The Correlation of 0.0 for junior colleges is accounted for by the fact that no program supervisor in a junior college reported an enrolment in a last year program. Information on other aspects of the questionnaire was supplied for last year programs in junior colleges.

The correlation of 0.324 for institutes, between first year enrolments and the number of hours of instruction weekly, tends to imply that the number of hours of instruction weekly was high where the enrolment was high.

The correlations of 0.437 for institutes and 0.357 for the college system, between the first year enrolments and the per cent of time for Lecture-Demonstration in the first year, suggest that the Lecture-Demonstration method tended to be employed for programs where the enrolment was high.

TABLE VI

ENROLMENT IN FIRST YEAR PROGRAMS AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean First Year Enrolment	45.90	23.45	19.29	39.33
Standard Deviation	40.21	20.18	11.80	37.07
Paired With Variable	Correlation Coefficients			
Length in Years (I)[a]	0.320[b]	-0.103	-0.297	0.238
Options (IV)	0.658	0.084	0.503	0.443
Entrance Requirements (V)	-0.102	0.690	0.370	0.056
Enrolment Last Year (VII)	0.534	0.831	0.0	0.556
Hours Per Week (VIII)	0.324	0.063	-0.041	0.130
Lecture-Demonstration First Year (X)	0.437	0.148	0.024	0.357
Shop First Year (XIV)	-0.322	-0.171	-0.444	-0.297
Work Experience First Year (XVI)	-0.180	-0.049	-0.797	-0.199
Technical Education (Theory) First Year (XXVII)	-0.057	0.515	-0.809	0.167
Technology (Theory) First Year (XXXI)	0.311	-0.241	0.699	0.156
Technology (Theory) Last Year (XXXII)	0.413	-0.385	1.000	0.241
General Education First Year (XXXV)	-0.326	0.064	0.653	-0.264

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

The correlations of -0.322 for institutes and -0.297 for the college system, between the first year enrolment and the per cent of time for Shop in the first year, tend to imply that Shop instruction was employed where enrolment was low. The correlation of -0.797 for junior colleges, between the first year enrolment and the per cent of time for Work Experience in the first year, tends to suggest a similar kind of relationship to that just suggested; namely, that Work Experience tended to be employed as an instructional method where enrolment was low.

The correlation of -0.809 for junior colleges, between first year enrolment and the per cent of time for Technical Education (Theory) in the first year curriculum, suggests that enrolments tended to be low where the per cent of Technical Education (Theory) was high.

The correlation of 0.311 for institutes, between the first year enrolment and the per cent of time for Technology (Theory) in the first year curriculum, suggests that a high per cent of time for Technology (Theory) tended to be found in programs where the enrolment was high. The correlation of 0.413 for institutes, between first year enrolment and the per cent of time for Technology (Theory) in the last year curriculum, suggests that the tendency indicated above was even stronger for the last year curriculum.

The correlations of -0.326 for institutes and -0.264 for the college system, between first year enrolment and the per cent of time for General Education in the first year curriculum, suggest that the proportion of General Education tended to be low where the enrolment was high.

Last Year Enrolment in Programs

Table VII shows statistics on last year enrolment. The mean enrolment for programs in the college system was 20.41, ranging from a high of 21.83 in institutes to a low of 11.41 in agricultural colleges. No student was shown as being enrolled in a last year program in a junior college.

The correlation of 0.796 for agricultural colleges, between the last year enrolment and the per cent of time for Work Experience in the first year curriculum, suggest that enrolment was higher where there was a larger proportion of curriculum time for Work Experience.

The correlations of 0.339 for institutes and 0.301 for the college system, between last year enrolment and the per cent of time Group Instructional Aides were employed, suggest that Group Instructional Aides were more likely to be used in last year programs where the enrolment was high than where it was low.

The correlations of -0.320 for institutes and plus 0.886 for agricultural colleges, between last year enrolment and the per cent of time for Technical Education (Theory) in the last year curriculum, suggest that there was a different approach to curriculum building in agricultural colleges than was the case in technical institutes. While there are several explanations that might be devised to account for this statistical pattern only one is suggested here. Possibly the programs at technical institutes tend to be structured so that abstract or theoretical content occurs in the early part of the program and that this kind of content occurs near the end of the agricultural

TABLE VII

ENROLMENT IN LAST YEAR PROGRAMS AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Last Year Enrolment	21.83	11.14	0.0	20.41
Standard Deviation	22.69	9.16	0.0	21.71
Paired With Variable	Correlation Coefficients			
Weeks Per Year (II)[a]	0.365[b]	0.882	c	0.401
Years Offered (III)	-0.103	0.891	c	-0.042
Enrolment First Year (VI)	0.534	0.831	c	0.556
Work Experience First Year (XVI)	-0.154	0.796	c	-0.126
Group Aides Last Year (XIX)	0.339	-0.328	c	0.301
Technical Education (Theory) Last Year (XXVIII)	-0.320	0.886	c	-0.215
Technology (Theory) First Year (XXXI)	0.368	-0.562	c	0.154

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

college program. The correlation of 0.368 for institutes, between last year enrolment and the per cent of time for Technology (Theory) in the first year curriculum, tends to imply that for high enrolment programs Technology (Theory) was concentrated in the first year.

Hours of Instruction per Week in First Year

Table VIII gives statistics relating to the number of hours of instruction scheduled weekly. The mean number of hours of instruction weekly for the colleges system was 29.98. This ranged from 31.00 in agricultural colleges down to 28.14 in junior colleges. The standard deviations suggest that the institute week was rather uniform but that there was considerable variability in the length of the week at agricultural and junior colleges.

The correlation of -0.290 for institutes, between the number of hours of scheduled instruction in first year and the use of Group Instructional Aides in first year, tends to imply that Group Instructional Aides were used more in programs having fewer hours of scheduled instruction weekly. The corresponding correlation for institutes, but with the last year use of Group Instructional Aides, was -0.331 which suggests a slightly stronger tendency in the last year. For the college system there were negative correlation coefficients suggesting an association between the number of hours of instruction weekly and the following four methodologies: Student Participation in instruction in the first year -0.319, Student Participation in the last year -0.525, Individualized

TABLE VIII

NUMBER OF HOURS PER WEEK IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Hours Per Week	30.04	31.00	28.14	29.98
Standard Deviation	1.50	5.14	7.45	3.47
Paired With Variable	Correlation Coefficients			
Length in Years (I)[a]	0.154	-0.195	0.907[b]	0.159
Years Offered (III)	0.014	0.217	0.870	0.120
Enrolment First Year (VI)	0.324	0.063	-0.041	0.130
Group Aides First Year (XVIII)	-0.290	0.333	-0.236	-0.104
Group Aides Last Year (XIX)	-0.331	0.501	-1.000	-0.211
Student Participation First Year (XX)	-0.114	0.382	-0.580	-0.319
Student Participation Last Year (XXI)	-0.170	-0.374	1.000	-0.525
Individualized Aides First Year (XXII)	-0.065	0.195	-0.516	-0.379
Individualized Aides Last Year (XXIII)	-0.255	-0.237	-1.000	-0.446
Technical Education (Practical) First Year (XXIX)	-0.409	0.166	0.202	0.032
Technical Education (Practical) Last Year (XXX)	-0.325	-0.333	-1.000	-0.287
Technology (Theory) First Year (XXXI)	0.289	-0.502	-0.428	-0.178
Technology (Practical) First Year (XXXIII)	0.367	-0.009	0.167	0.139

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

Instructional Aides in the first year -0.379, and, Individualized Instructional Aides in the last year -0.446. The suggestion is that there was an association between the number of hours of instruction scheduled weekly and these particularized ways of giving instruction, with these methods tending to be used to a greater extent when there were fewer hours of instruction weekly.

The correlation of -0.409 for institutes, between the number of hours of instruction scheduled weekly and the per cent of time for Technical Education (Practical) in first year, suggests that a greater proportion of Technical Education (Practical) was found in the curriculum when there were fewer hours of instruction scheduled weekly. The correlations of -0.325 for institutes and -0.287 for the college system, between the number of hours scheduled weekly and the per cent of time for Technical Education (Practical) in the last year curriculum, suggest a pattern similar to the one just indicated above.

The correlations of 0.289 and 0.367 for institutes, between the number of hours of scheduled instruction weekly and the per cent of time in the curriculum for Technology (Theory) in first year Technology (Practical) in first year respectively, suggest that extra instructional time obtained by scheduling a longer week may have been used to increase the time for both Technology (Theory) and Technology (Practical) in the first year curriculum.

II. STATISTICS ON INSTRUCTIONAL METHODOLOGIES

This section provides statistics on the instructional methodologies reported for programs as a response to question thirteen in the questionnaire. Table IX provides a summary of these data. Since the supervisors of programs were asked to assign the instructional time for their program among eight methodologies listed and two "other" categories, several of the categories tended to be not used in any particular response. Two categories on the questionnaire: Simulated Work Experience (on campus), and On-the-Job Experience (usually off campus), were collapsed into one category of Work Experience because of the low response frequency and because supervisors had apparent difficulty in distinguishing between them. The category "other" was used to report Field Trips for sixteen first year programs and fourteen last year programs, therefore a category, Field Trips, was included for computer processing.

Distribution of Instructional Time Among Methodologies

Table IX shows the distribution of instructional time among methodologies. Supervisors were asked to complete this section in terms of their own opinion rather than to use external indicators that might allow for calculations.

All programs used the Lecture-Demonstration method. The extent of use is indicated by the mean for the college system of 48.2 per cent for first year programs and 42.8 per cent in last year programs. In contrast with this method, only nine programs reported

TABLE IX

DISTRIBUTION OF INSTRUCTIONAL TIME AMONG METHODOLOGIES BY PER CENT OF TOTAL TIME

	Institutes		Agricultural Colleges		Junior Colleges		College System	
Year of Program	First	Last	First	Last	First	Last	First	Last
Number of Programs Reported	49	45	11	8	7	2	67	55
Lecture-Demonstration	49.0	42.7	50.5	42.5	38.6	45.0	48.2	42.8
Laboratory Instruction	32.9	35.8	28.4	30.4	25.6	7.5	31.4	34.0
Shop Instruction	6.5	3.2	6.9	6.4	7.1	0.0	6.6	3.5
Work Experience	5.0	10.4	5.2	6.9	7.9	7.5	5.3	9.8
Group Instructional Aides	2.6	2.2	2.6	2.1	4.3	5.0	2.8	2.3
Student Participation	3,3	3.4	5.4	9.5	15.0	30.0	4.9	5.2
Individualized Instruction	0.1	0.5	0.6	1.6	2.6	5.0	0.4	0.9
Field Trips	0.6	0.7	0.5	0.6	0.0	0.0	0.5	0.7

using Individualized Instructional Aides in the first year and ten in the last year.

The figures for the methodologies are quite uniform for the three categories of institution. The major departure from uniformity was in the increased emphasis on Student Participation in instruction at junior colleges. For the college system approximately five per cent of the time was used in this way, but for the junior colleges fifteen per cent was reported for first year, based on seven programs, and thirty per cent in the last year based, however, on just two programs. These junior college based technical programs represented just over ten per cent of the technical programs reported for the college system.

Per Cent of Lecture-Demonstration in the First Year

Table X gives the per cent of instructional time used for Lecture-Demonstration in the first year programs. Information on the questionnaire indicated that this method implied that the instructor was speaking. This form of instruction occupied nearly one-half of the total instructional time, except at junior colleges, where the figure was 38.6 per cent.

The correlations of 0.676 for institutes and 0.668 for the college system, between the per cent of time for Lecture-Demonstration in the first year and last year, appear to imply no more than some correspondence in method between different years of the same program.

The correlations of -0.881 for agricultural colleges and

TABLE X

PER CENT LECTURE-DEMONSTRATION IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	49.04	50.46	38.57	48.18
Standard Deviation	12.91	17.64	16.41	14.57
Paired With Variable	Correlation Coefficients			
Years Offered (II)[a]	0.035	0.296	-0.821	0.077
Options (IV)	0.271	0.608	-0.587	0.217
Enrolment First Year (VI)	0.437	0.148	0.024	0.357
Lecture-Demonstration Last Year (XI)	0.676	0.651	1.000	0.668
Laboratory First Year (XII)	-0.142	-0.881	-0.376	-0.291
Laboratory Last Year (XIII)	-0.091	-0.804	-1.000	-0.185
Shop First Year (XIV)	-0.440	-0.375	-0.330	-0.397
Shop Last Year (XV)	-0.289	-0.409	0.0	-0.280
Work Experience First Year (XVI)	-0.369	-0.231	-0.304	-0.338
Group Aides Last Year (XIX)	0.117	-0.791	-1.000	-0.039
Student Participation First Year (XX)	-0.427	0.024	-0.136	-0.310
Technical Education (Theory) First Year (XXVII)	0.375	0.416	-0.478	0.320
Technical Education (Practical) First Year (XXIX)	-0.121	-0.548	-0.506	-0.281
Technology (Theory) First Year (XXXI)	0.278	0.396	-0.459	0.320
Technology (Theory) Last Year (XXXII)	0.476	-0.057	1.000	0.365
Technology (Practical) First Year (XXXIII)	-0.379	-0.554	0.283	-0.277
Technology (Practical) Last Year (XXXIV)	-0.288	-0.754	1.000	-0.333
General Education First Year (XXXV)	-0.340	0.483	-0.021	-0.174

[a]Refers to table numbers

-0.291 for the college system, between the time for Lecture-Demonstration in the first year and Laboratory instruction in the first year, appear to suggest that the Lecture-Demonstration method was inversely associated with the Laboratory method. At agricultural colleges a similar kind of association was suggested by the correlation of -0.804 between Lecture-Demonstration in the first year and Laboratory in the last year.

The correlations of -0.440 for institutes and -0.397 for the college system, between the per cent of Lecture-Demonstration in the first year and the per cent of time for Shop instruction in the first year, suggest an inverse relationship between Lecture-Demonstration and Shop methods. A similar kind of association was implied for the college system by the correlation of -0.280 between first year time for Lecture-Demonstration and last year time for Shop.

The correlations of -0.369 for institutes and -0.338 for the college system, between the per cent of time for Lecture-Demonstration in the first year and Work Experience in the first year, again imply an inverse association between Lecture-Demonstration and Work Experience.

The correlation of -0.791 for agricultural colleges, between the per cent of time for Lecture-Demonstration in the first year and the time for Group Instructional Aides in the last year, suggest that Lecture-Demonstration and Group Instructional Aides tended to be mutually exclusive. The correlation of -0.427 for institutes, between the Lecture-Demonstration method in first year and Student Participation

in the first year, suggests an incompatibility between this Lecture-Demonstration method and Student Participation.

The correlations of 0.375 for institutes and 0.320 for the college system, between the per cent of time for the Lecture-Demonstration method in the first year and the time for Technical Education (Theory) in the first year curriculum, indicate a strong association between the use of the Lecture-Demonstration method and instruction in theory. The correlation of -0.281 for the college system, between this instructional method and the time for Technical Education (Practical) in first year reinforces the idea above.

The correlation of 0.320 for the college system, between time using the Lecture-Demonstration method and the time for Technology (Theory) in first year, reinforces the notion that this method tended to be used when theory was to be taught. This was supported by correlations with Technology (Theory) in the last year program of 0.476 for institutes and 0.365 for the college system. Negative correlations were found with the practical curriculum elements and this instructional method for institutes in the first and last years, for the college system in the last year, and for agricultural colleges in the last year.

The correlation of -0.340 for institutes, between the time for Lecture-Demonstration methods and the per cent of time for General Education in the first year curriculum, suggests an inverse relationship between the time for the Lecture-Demonstration method and General Education in the curriculum.

Per Cent of Lecture-Demonstration in the Last Year

The per cent of time where the Lecture-Demonstration method was used dropped from 48.2 in the first year to 42.8 in the last year. These and other data relating to the time for Lecture-Demonstration in the last year are shown in Table XI. The released time was apparently diverted to instruction using laboratories and work experience programs.

The correlation of -0.713 for agricultural colleges, between Lecture-Demonstration and Laboratory time in the last year, suggests a dichotomy between the lecture and laboratory methods previously noted. Correlations of -0.613 for institutes and -0.576 for the college system, between the time for Lecture-Demonstration in the last year and the time for Work Experience in the last year, indicate a similar kind of relationship.

Positive correlations were observed between Technical Education (Theory) in first and last years for both the institutes and the college system, and, the per cent of Lecture-Demonstration in the last year, all of which tended to support the nature of the associations observed to this point between Lecture-Demonstration methods and theory or practical curriculum elements.

Per Cent of Laboratory Instruction in First Year

Table XII provides data relating to Laboratory instruction in the first year.

The mean per cent of time for the Laboratory method was 31.4 for the college system in first year programs. The lowest per cent

TABLE XI

PER CENT LECTURE-DEMONSTRATION IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=67)
Mean Per Cent of Time	42.76	42.50	45.00	42.80
Standard Deviation	16.71	16.20	5.00	16.36
Paired With Variable	Correlation Coefficients			
Lecture-Demonstration First Year (X)[a]	0.676[b]	0.651	c	0.668
Laboratory Last Year (XIII)	-0.082	-0.713	c	-0.150
Work Experience Last Year (XVII)	-0.613	-0.268	c	-0.576
Student Participation First Year (XX)	-0.513	-0.237	c	-0.305
Technical Education (Theory) First Year (XXVII)	0.383	0.162	c	0.299
Technical Education (Theory) Last Year (XXVIII)	0.421	0.432	c	0.398
Technology (Theory) Last Year (XXXII)	0.542	0.270	c	0.469
Technology (Practical) First Year (XXXIII)	-0.257	-0.643	c	-0.301
Technology (Practical) Last Year (XXXIV)	-0.630	-0.814	c	-0.614

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

TABLE XII

PER CENT LABORATORY IN FIRST YEAR AND
ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	32.86	28.46	25.57	31.37
Standard Deviation	12.62	13.83	20.48	14.08
Paired With Variable	Correlation Coefficients			
Options (IV)[a]	0.172	-0.728[b]	0.317	-0.003
Entrance Requirements (V)	0.378	0.019	-0.039	0.294
Lecture-Demonstration First Year (X)	-0.142	-0.881	-0.376	-0.291
Laboratory Last Year (XIII)	0.582	0.804	1.000	0.649
Shop First Year (XIV)	-0.423	0.119	-0.419	-0.343
Shop Last Year (XV)	-0.406	0.150	0.0	-0.321
Work Experience First Year (XVI)	-0.446	0.060	-0.532	-0.401
Group Aides First Year (XVIII)	-0.425	0.240	-0.212	-0.297
Group Aides Last Year (XIX)	-0.492	0.663	1.000	-0.351
Student Participation Last Year (XXI)	-0.032	0.073	-1.000	-0.338
Individualized Aides First Year (XXII)	0.016	-0.507	-0.293	-0.257
Technology (Practical) First Year (XXXIII)	0.159	0.274	0.695	0.311
Technology (Practical) Last Year (XXXIV)	0.283	0.562	-1.000	0.357

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

was 25.6 for junior colleges and the highest was 32.9 for institutes, indicating a small range.

There was a high correlation for the per cent of Laboratory instruction time between the first and last years as indicated by correlations; 0.582 for institutes, 0.804 for agricultural colleges, and 0.649 for the college system.

An inverse association was indicated between the time for Laboratory instruction in the first year and the time for Shop instruction in both first and last years. Correlations of -0.423 for institutes and -0.343 for the system were observed for the first year and -0.406 for institutes and -0.321 for the system were observed for the last year. There was a similar kind of inverse association between the time for first year Laboratory method and the time for Work Experience in the first year as indicated by correlations of -0.446 for institutes and -0.401 for the college system. This pattern was replicated by negative correlations between first year Laboratory, and both first and last year time for Group Instructional Aides for institutes and the college system.

Negative correlations were observed for the college system and for institutes between the time for Laboratory in the first year and the time for Student Participation in instruction in the last year, and Laboratory and Individualized Instructional Aides, both in the first year.

There was an indicated connection between first year Laboratory time and the curriculum element Technology (Practical) in both first

and last years as evidenced by correlations of 0.311 and 0.357 for the college system.

Anticipated associations between the Laboratory method and the Technical Education (Practical) curriculum element, which were inherent in the definitions and examples used to explain the questionnaire, were not supported by the magnitudes of the correlation coefficients observed.

Per Cent of Laboratory Instruction in Last Year

Table XIII shows statistics relating to the per cent of Laboratory instruction in last year programs. The institutes reported the highest use of time in Laboratory with 35.8 per cent. The least use of this method was in junior colleges where 7.5 per cent of time was used in this way. The mean for the system was 34.0 per cent.

The correlations of -0.499 for institutes and -0.447 for the college system, between the time for Laboratory in the last year and the time for Work Experience in the last year, suggest that these two methods were in competition for time in the curriculum, or, that the two methods were incompatible. Negative correlations were observed between the time for Laboratory in the last year for both institutes and the college system, and the time for Group Instructional Aides in both first and last years. This pattern was continued for the college system with respect to Individualized Instructional Aides in both first and last years where negative correlations were observed.

The correlation of -0.756 for agricultural colleges, between the time for Laboratory in the last year and the time for the

TABLE XIII

PER CENT LABORATORY IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	35.84	30.37	7.50	34.02
Standard Deviation	17.74	11.87	7.50	17.62
Paired With Variable	Correlation Ceofficients			
Lecture-Demonstration First Year (X)[a]	-0.091	-0.804	c	-0.185
Lecture-Demonstration Last Year (XI)	-0.082	-0.713	c	-0.150
Laboratory First Year (XII)	0.582	0.804	c	0.649
Work Experience Last Year (XVII)	-0.499	-0.472	c	-0.447
Group Aides First Year (XVII)	-0.487	0.428	c	-0.367
Group Aides Last Year (XIX)	-0.324	0.572	c	-0.249
Student Participation First Year (XX)	-0.124	0.004	c	-0.284
Student Participation Last Year (XXI)	-0.199	0.097	c	-0.328
Technical Education (Theory) Last Year (XXVIII)	-0.106	-0.756	c	-0.116

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

curriculum element Technical Education (Theory) in the last year, suggests that the Laboratory method was not supportive to this curriculum element.

Per Cent of Shop Instruction in First Year

Table XIV gives the per cent of Shop instruction in the first year. Shop instruction was indicated for twenty-six of the sixty-seven first year programs. Nineteen of these were at institutes, five were at agricultural colleges, and two were at junior colleges. The mean Shop instruction based on sixty-seven first year programs was 6.6 per cent. When a mean was calculated based on the twenty-six programs employing the method, the result was 17.0 per cent.

Correlations of 0.759, 0.974 and 0.777 were observed for institutes, agricultural colleges and the college system respectively between the use of Shop instruction in first and last years. High correlations for methods between corresponding years would normally be expected.

There was a correlation of 0.834 for junior colleges between first year Shop and first year Work Experience. The corresponding correlations for institutes and agricultural colleges were small, but they were negative. This pattern suggests that Shop and Work Experience were supportive at junior colleges.

There was a correlation of -0.668 for agricultural colleges, between the time for Shop and Student Participation methods both in the first year, suggesting that Shop was not considered to be a form

TABLE XIV

PER CENT SHOP IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	6.47	6.91	7.14	6.61
Standard Deviation	11.14	8.38	11.29	10.75
Paired With Variable	Correlation Coefficients			
Options (IV)[a]	-0.364[b]	-0.189	-0.400	-0.324
Entrance Requirements (V)	-0.445	-0.164	-0.394	-0.397
Enrolment First Year (VI)	-0.322	-0.171	-0.444	-0.297
Lecture-Demonstration First Year (X)	-0.440	-0.375	-0.330	-0.397
Laboratory First Year (XII)	-0.423	0.119	-0.419	-0.343
Shop Last Year (XV)	0.759	0.974	0.0	0.777
Work Experience First Year (XVI)	-0.032	-0.194	0.834	0.054
Student Participation First Year (XX)	-0.075	-0.668	-0.394	-0.159
Technical Education (Practical) First Year (XXIX)	0.073	0.210	0.889	0.212
Technology (Theory) First Year (XXXI)	-0.307	-0.014	-0.446	-0.247
Technology (Practical) First Year (XXXIII)	0.367	0.288	-0.576	0.192

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

of Student Participation in instruction.

The correlation of 0.889 for junior colleges, between Shop and the time for Technical Education (Practical) in the first year, suggests that Shop was regarded as a form of practical education.

The correlations of -0.307 for institutes and -0.247 for the system, between the time for Shop and the time for Technology (Theory) in the first year, suggest that this method was not used particularly to instruct this curriculum element. The correlation of 0.367 for institutes between Shop time and the time for Technology (Practical) in the first year, suggests that Shop was regarded as a method of implementing this practical curriculum element.

Per Cent of Shop Instruction in the Last Year

Table XV gives statistics relating to Shop instruction in the last year programs. Seventeen of the fifty-five last year programs had Shop instruction reported. Twelve of these programs were at institutes, five were at agricultural colleges, and none was at a junior college. The mean per cent of Shop time was 3.54 based on fifty-five programs and 11.45 based on seventeen programs.

The correlation of -0.323 for institutes, between the time for Shop in the last year and Technology (Theory) in the first year, suggests that there may have been a tendency to concentrate the theory part of technology in the first year and the shop practice in the last year. The correlations of 0.407 for institutes and 0.343 for the college system, between the time for Shop in the last year and Technology (Practical) in the first year, did not support the kind

TABLE XV

PER CENT SHOP IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	3.20	6.37	0.0	3.54
Standard Deviation	9.32	6.00	0.0	8.83
Paired With Variable	Correlation Coefficients			
Years Offered (III)[a]	0.439[b]	0.373	c	0.428
Entrance Requirements (V)	-0.252	-0.229	c	-0.280
Lecture-Demonstration First Year (X)	-0.289	-0.409	c	-0.280
Laboratory First Year (XII)	-0.406	0.150	c	-0.321
Shop First Year (XIV)	0.759	0.794	c	0.777
Technology (Theory) First Year (XXXI)	-0.323	-0.266	c	-0.212
Technology (Practical) First Year (XXXIII)	0.407	0.0	c	0.281
Role of the Graduate (XXXVII)	0.323	0.0	c	0.281

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

of partitioning of activities between years suggested above for these two elements.

The correlations of 0.323 for institutes and 0.281 for the system, between Shop in the last year and the role of the graduate, suggest that Shop instruction in the last year was supportive to the activity of preparing graduates for the function of job competence.

Per Cent of Work Experience in First Year

Twenty-four first year programs reported using Work Experience as an instructional method. Fifteen programs were at institutes, six were at agricultural colleges, and three were at junior colleges. Statistics related to first year Work Experience are shown in Table XVI. The mean time for the system, based on sixty-seven programs, was 5.36 per cent but the mean time based on the twenty-four programs using the method was 14.96 per cent. There was only a slight variation in use of the method between categories on institution.

Correlations of 0.453 for institutes and 0.462 for the college system, between the time for Work Experience in first year and last year, suggest consistency in the use of this method between different years of the same program.

The correlation of 0.840 for junior colleges between Work Experience time and time for Technical Education (Theory) both in the first year, may indicate an attempt to balance theoretical and practical studies. An alternate approach may be indicated by the correlations of 0.301 for institutes and 0.311 for the system, between time for Work Experience in first year and time for Technical

TABLE XVI

PER CENT WORK EXPERIENCE IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	5.04	5.18	7.86	5.36
Standard Deviation	9.74	5.25	9.20	9.14
Paired With Variable	Correlation Coefficients			
Years Offered (III)[a]	0.290[b]	0.181	0.045	0.238
Enrolment First Year (VI)	-0.180	-0.049	-0.797	-0.199
Enrolment Last Year (VII)	-0.154	0.796	0.0	-0.126
Lecture-Demonstration First Year (X)	-0.369	-0.231	-0.304	-0.338
Laboratory First Year (XII)	-0.446	0.060	-0.532	-0.401
Shop First Year (XIV)	-0.032	-0.194	0.834	0.054
Work Experience Last Year (XVII)	0.453	0.708	1.000	0.462
Technical Education (Theory) First Year (XXVII)	0.066	-0.014	0.840	0.093
Technical Education (Theory) Last Year (XXVIII)	0.301	0.394	1.000	0.311
Technical Education (Practical) First Year (XXIX)	-0.108	0.255	0.963	0.104

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

Education (Theory) in the last year. The implication from the negative sign implies concentration of the method and curriculum element in alternate years. The correlation of 0.963 for junior colleges, between the per cent of time for first year Work Experience and time for Technical Education (Practical) in the first year, suggests that the method and the element were supportive in junior colleges. The corresponding correlation coefficient for institutes was small and negative.

Per Cent of Work Experience in the Last Year

Twenty-nine of the fifty-five programs with a last year reported Work Experience as an instructional method. Statistics relating to this method are shown in Table XVII. Twenty-four of these programs were at institutes, four were at agricultural colleges and one was at a junior college. The mean per cent of instructional time was 9.76 for the last year programs.

Possible associations with other instructional methods are suggested by the following correlations. The correlations of 0.494 for institutes and 0.299 for the college system, between last year time for Work Experience and time using Student Participation methods, suggest that these methods were used with students in the same programs. The correlations of 0.865 and 0.797 for agricultural colleges in first and last years respectively for Individualized Instructional Aides and Work Experience in the last year, suggest a relationship between Work Experience and Individualized Instructional Aides that was present at agricultural colleges but not at other

TABLE XVII

PER CENT WORK EXPERIENCE IN LAST YEAR AND
ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	10.38	6.87	7.50	9.76
Standard Deviation	20.80	8.27	7.50	19.17
Paired With Variable	Correlation Coefficients			
Weeks Per Year (II)[a]	0.425[b]	0.173	c	0.327
Options (IV)	-0.222	0.742	c	-0.152
Lecture-Demonstration Last Year (XI)	-0.613	-0.268	c	-0.576
Laboratory Last Year (XIII)	-0.499	-0.472	c	-0.447
Work Experience First Year (XVI)	0.453	0.707	c	0.462
Student Participation First Year (XX)	0.494	0.394	c	0.299
Individualized Aides First Year (XXII)	-0.022	0.865	c	0.075
Individualized Aides Last Year (XXIII)	-0.090	0.797	c	0.035
Technology (Theory) Last Year (XXXII)	-0.354	-0.699	c	-0.365
Technology (Practical) Last Year (XXXIV)	0.450	0.154	c	0.429
General Education First Year (XXXV)	0.325	-0.253	c	0.237

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

categories of institutions

Possible connections between the Work Experience method in the last year and other curriculum elements are suggested by the correlations which follow. There were correlations of -0.354 for institutes and -0.365 for the college system with the time for Technology (Theory) in the last year, which suggest competition between Work Experience and Technology (Theory). This notion is supported by the correlations of 0.450 for institutes and 0.429 for the college system with Technology (Practical) in the last year.

The correlation of 0.325 for institutes, between the time for Work Experience in the last year and the role of the graduate, suggests that Work Experience was associated with preparing graduates for the role of job competence rather than support to a professional.

Per Cent Group Instructional Aides in First Year

Table XVIII displays statistics relating to the use of Group Instructional Aides. These kinds of aides were reported as being used for 2.78 per cent of the time for the college system. Institutes used them for 2.59 per cent of the time and junior colleges used them for 4.29 per cent of the time.

Correlations indicating the degree of consistency in the use of these aides between first and last years were found and are given in the table. Possible relationships with other instructional methods are suggested by the following correlations. There was a correlation of 0.471 for institutes with Student Participation in the last year, and there were correlations of 0.855 for junior

TABLE XVIII

PER CENT FOR GROUP INSTRUCTIONAL AIDES IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	2.59	2.64	4.29	2.78
Standard Deviation	3.06	2.90	3.19	3.09
Paired With Variable	Correlation Coefficients			
Hours Per Week (VIII)[a]	-0.290[b]	0.333	-0.236	-0.104
Laboratory First Year (XII)	-0.425	0.240	-0.212	-0.297
Laboratory Last Year (XIII)	-0.487	0.428	1.000	-0.367
Group Aides Last Year (XIX)	0.869	0.796	1.000	0.872
Student Participation Last Year (XXI)	0.471	-0.328	-1.000	0.090
Individualized Aides First Year (XXII)	0.116	0.004	0.855	0.315
Technical Education (Theory) First Year (XXVII)	0.226	-0.019	0.756	0.168

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

colleges and 0.315 for the college system with Individualized Instructional Aides in the first year. The last two correlations may have indicated an attempt to balance group with individualized methods; however, only five junior college programs reported using Group Instructional Aides.

The correlation of 0.756 for junior colleges, between the time for Group Instructional Aides in the first year and the time for Technical Education (Theory) in the first year, may imply that theory intensive programs tended to employ these kinds of aides.

Per Cent Group Instructional Aides in Last Year

Approximately sixty per cent of programs reported some use of these aides in both first and last years. Junior colleges made more use of these aides than did other categories of institution. For the college system, the mean time these aides were reported as being used was 2.25 per cent. Table XIX provides statistics on Group Instructional Aides in last year programs.

The correlation of 0.458 for institutes, between the time for Group Instructional Aides in the last year and the time for Student Participation in instruction in the last year, suggests a balancing of group and individual methods in the institutes. The correlation of 0.305 for the college system, between the time for Group Instructional Aides in the last year and Individualized Instructional Aides in the first year may indicate a pattern similar to the one suggested above.

The following correlations were between the time for Group

TABLE XIX

PER CENT FOR GROUP INSTRUCTIONAL AIDES IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	2.16	2.12	5.00	2.25
Standard Deviation	2.60	1.83	5.00	2.68
Paired With Variable	Correlation Coefficients			
Options (IV)[a]	-0.016	-0.827[b]	c	-0.102
Enrolment Last Year (VII)	0.339	-0.328	c	0.301
Hours Per Week (VIII)	-0.331	0.501	c	-0.211
Lecture=Demonstration First Year (X)	0.117	-0.719	c	-0.039
Laboratory First Year (XII)	-0.492	0.663	c	-0.351
Laboratory Last Year (XIII)	-0.324	0.572	c	-0.249
Group Aides First Year (XVIII)	0.869	0.796	c	0.872
Student Participation Last Year (XXI)	0.458	-0.447	c	0.089
Individualized Aides First Year (XXII)	0.081	-0.489	c	0.305
Technical Education (Theory) First Year (XXVII)	0.302	-0.422	c	0.228
Technology (Theory) Last Year (XXXII)	0.401	0.382	c	0.292
Technology (Practical) Last Year (XXXIV)	-0.391	0.559	c	-0.323

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

Instructional Aides in the last year and one of the curriculum elements. The correlation of 0.302 for institutes with Technical Education (Theory) in the first year, suggests the possibility that these aides were used in institutes more for theory instruction than for other kinds of instruction. This possibility is reinforced by the correlation of 0.401 for institutes and 0.292 for the college system with the time for Technology (Theory) in the last year. An inverse kind of association is suggested by the correlations of -0.391 for institutes and -0.323 for the college system, with the time for Technology (Practical) in the last year.

Per Cent Student Participation in First Year

Table XX shows statistics relating to the per cent of instructional time for Student Participation in instruction in the first year. Most of the program supervisors reported use of Student Participation methods in first year except for those at technical institutes where just over one-half reported use of this method. The time for this method was 3.31 per cent in institutes, 5.36 per cent at agricultural colleges, 15.00 per cent at junior colleges, and 4.87 per cent for the system.

The following two sets of correlations indicate possible relationships with other methods. The correlation of 0.679 for the college system with Student Participation in the last year, suggests that the usual relationship between first and last year was present. The correlation of 0.349 for institutes suggests a possible connection between Student Participation and Individualized

TABLE XX

PER CENT FOR STUDENT PARTICIPATION IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	3.31	5.36	15.00	4.87
Standard Deviation	5.21	3.84	16.04	7.86
Paired With Variable	Correlation Coefficients			
Length in Years (I)[a]	-0.023	-0.381	-0.810	-0.112
Years Offered (III)	-0.007	-0.200	-0.792	-0.127
Options (IV)	0.087	-0.008	0.789	0.265
Entrance Requirements (V)	-0.061	0.078	0.861	0.091
Hours Per Week (VIII)	-0.114	0.382	-0.580	-0.319
Lecture-Demonstration First Year (X)	-0.427	0.024	-0.136	-0.310
Lecture-Demonstration Last Year (XI)	-0.513	-0.237	1.000	-0.305
Laboratory Last Year (XIII)	-0.124	0.004	-1.000	-0.284
Shop First Year (XIV)	-0.075	-0.668	-0.394	-0.159
Work Experience Last Year (XVII)	0.494	0.394	-1.000	0.299
Student Participation Last Year (XXI)	0.236	0.567	1.000	0.679
Individualized Aides Last Year (XXIII)	0.349	-0.028	-1.000	0.179
Technical Education (Theory) First Year (XXVII)	-0.175	0.141	-0.345	-0.290
Technical Education (Theory) Last Year (XXVIII)	-0.404	-0.256	-1.000	-0.408
Technology (Theory) First Year (XXXI)	-0.092	-0.059	0.775	0.153
Technology (Practical) Last Year (XXXIV)	0.472	0.570	1.000	0.258
General Education First Year (XXXV)	0.445	0.397	0.589	0.593
Role of the Graduate (XXXVII)	0.184	0.150	0.455	0.292

[a]Refers to table number

Instructional Aides.

Several correlations support possible connections between Student Participation in the first year and the following curriculum elements. A correlation of 0.290 with Technical Education (Theory) in first year for the college system suggests that Student Participation may have been particularly involved in instructing this theory element. This association was strengthened by correlations of -0.404 for institutes and -0.408 for the college system with this same curriculum element in the last year. The changed sign implies that the relationship was inverted. The correlation of 0.775 for junior colleges with Technology (Theory) in the first year may imply that these colleges used participatory methods to instruct technology to a greater extent than was the case for programs in other categories of institutions. The correlation of 0.472 for institutes with Technology (Practical) in the last year, suggests a dichotomy with more theory in first year programs and more practical in last year programs.

Correlations of 0.455 for institutes and 0.593 for the college system, between the time for Student Participation in the first year and General Education in the first year, suggest that this method was used to instruct what was considered to be General Education in the institutes.

The correlation of 0.292 for the college system, between the time for Student Participation in the first year and the role of the graduate, suggests that Student Participation was used to a greater

extent when the role was seen as job competence. Skill development exercises may have constituted this Student Participation.

Per Cent Student Participation in Last Year

Table XXI displays statistics relating to Student Participation in the last year. Slightly more time was reported for Student Participation in instruction in last year than in first year programs. The mean time for the college system was 5.22 per cent with a range from 3.36 per cent in institutes to 30.00 per cent in junior colleges.

A correlation of -0.340 for the college system, between the time for Student Participation in the last year and the time for Technical Education (Theory) in the first year curriculum, suggests that there was an inverse relationship between this method and this element. The correlations of 0.323 and 0.297 for the college system between this method and the two elements, Technology (Theory) in first year and Technology (Theory) in last year, imply that the inverse relationship noted above was probably not due to the theory aspect since it was common to the two relationships.

Positive correlations were observed between Student Participation in the last year and General Education in the first year for the college system, but with General Education in the last year for institutes. These were 0.307 for the system and 0.325 for institutes. The corresponding correlations for the agricultural colleges were negative. These correlations suggest that the institutes and agricultural colleges had program supervisors with different approaches to instruction as regards General Education.

TABLE XXI

PER CENT FOR STUDENT PARTICIPATION IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	3.36	9.50	30.00	5.22
Standard Deviation	3.71	5.72	20.00	7.64
Paired With Variable	Correlation Coefficients			
Hours Per Week (VIII)[a]	-0.170	-0.374	c	-0.525
Laboratory First Year (XII)	-0.032	0.073	c	-0.338
Laboratory Last Year (XIII)	-0.199	0.097	c	-0.328
Group Aides First Year (XVIII)	0.471[b]	-0.328	c	0.090
Group Aides Last Year (XIX)	0.458	-0.447	c	0.089
Student Participation First Year (XX)	0.236	0.567	c	0.679
Technical Education (Theory) First Year (XXVII)	-0.006	-0.220	c	-0.340
Technology (Theory) First Year (XXXI)	-0.107	0.057	c	0.323
Technology (Theory) Last Year (XXXII)	0.114	-0.031	c	0.297
General Education First Year (XXXV)	0.109	-0.351	c	0.307
General Education Last Year (XXXVI)	0.325	-0.149	c	0.242

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

Per Cent Individualized Instructional Aides in First Year

Table XXII shows statistics relating to Individualized Instructional Aides in the first year. The mean per cent of time ranged from 0.10 in institutes to 3.57 in junior colleges with a mean for the college system of 0.43 per cent.

Correlations of 0.302 for institutes, 0.638 for agricultural colleges, and 0.782 for the college system between the use of these aides in first and last years were observed.

Correlations of 0.638 for agricultural colleges and 0.897 for junior colleges, between the time for Individualized Instructional Aides in first year and the time for Technical Education (Theory) in first year, suggest that these aides were supportive to this curriculum element at these institutions. The corresponding correlation for institutes was small but negative indicating a somewhat different approach to this curriculum element. A similar pattern of signs was observed between correlations relating the time for Technical Education (Practical) in the last year. Again, the correlation was small but negative for institutes but was 0.373 for the college system.

Per Cent Individualized Instructional Aides in Last Year

Table XXIII gives statistics on the use of Individualized Instructional Aides. The time for these aides was 0.86 per cent for the college system which was almost double their use in first year programs.

TABLE XXII

PER CENT FOR INDIVIDUALIZED INSTRUCTIONAL AIDES IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	0.10	0.54	3.57	0.43
Standard Deviation	0.46	1.44	3.29	1.48
Paired With Variable	Correlation Coefficients			
Options (IV)[a]	-0.138	0.722[b]	0.082	0.158
Hours Per Week (VIII)	-0.065	0.195	-0.516	-0.379
Laboratory First Year (XII)	0.016	-0.507	-0.293	-0.257
Work Experience Last Year (XVII)	-0.022	0.865	1.000	0.075
Group Aides First Year (XVIII)	0.116	0.004	0.855	0.315
Group Aides Last Year (XIX)	0.081	-0.489	1.000	0.305
Individualized Aides Last Year (XXIII)	0.302	0.971	1.000	0.782
Technical Education (Theory) First Year (XXVII)	-0.158	0.638	0.897	0.060
Technical Education (Practical) Last Year (XXX)	-0.075	0.536	1.000	0.373

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

TABLE XXIII

PER CENT FOR INDIVIDUALIZED INSTRUCTIONAL AIDES IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	0.53	1.62	5.00	0.85
Standard Deviation	1.41	3.24	5.00	2.20
Paired With Variable	Correlation Coefficients			
Options (IV)[a]	0.280[b]	0.661	c	0.360
Hours Per Week (VIII)	-0.255	-0.237	c	-0.446
Work Experience Last Year (XVII)	-0.090	0.797	c	0.035
Student Participation First Year (XX)	0.349	-0.028	c	0.179
Individualized Aides First Year (XXII)	0.302	0.971	c	0.782
Field Trips First Year (XXIV)	0.336	-0.190	c	0.064
Technical Education (Practical) Last Year (XXX)	0.071	0.433	c	0.365
Role of the Graduate (XXXVII)	0.422	0.0	c	0.192

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

The correlation of 0.336 for institutes, between the time for Individualized Instructional Aides in the last year and the time for Field Trips in the first year, suggests that that there was a trend for certain programs to either use or not use both methods.

The correlation of 0.365 for the college system, between the time for Individualized Instructional Aides in the last year and the time for Technical Education (Practical) in the last year suggests that this method was employed particularly to instruct that curriculum element.

The correlation of 0.422 for institutes, between the time for Individualized Instructional Aides in the last year and the role of the graduate, suggests that these aides were more employed when the role was job competence.

Per Cent Field Trips in First Year

Table XXIV provides data on the use of Field Trips in the first year. Field Trips were employed for 0.51 per cent of the instructional time in the college system. The range was from zero use at junior colleges to 0.59 per cent of the time at technical institutes.

The correlations of 0.848 for institutes and 0.885 for the system, between the use of Field Trips in first and last years, suggest consistency between years of the same program.

The correlation of 0.664 for agricultural colleges, between the time for Field Trips in first year and the time for Technology (Practical) in the first year curriculum, suggests at the least that this method may have been employed for this kind of instruction.

TABLE XXIV

PER CENT FIELD TRIPS IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Insti-tutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	0.59	0.45	0.0	0.51
Standard Deviation	1.03	1.44	0.0	1.07
Paired With Variable	Correlation Coefficients			
Individualized Aides Last Year (XXIII)[a]	0.336[b]	-0.190	0.0	0.064
Field Trips Last Year (XXV)	0.848	1.000	0.0	0.885
Technology (Practical) First Year (XXXIII)	-0.192	0.664	0.0	0.009

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

Per Cent Field Trips in Last Year

Statistics on the use of Field Trips in last year are shown in Table XXV. Field Trips were used slightly more in last year than in first year programs with a mean for the system of 0.66 per cent. The use ranged from zero at junior colleges to 0.69 at institutes.

The correlations of 0.382 for institutes and 0.278 for the college system, between the time for Field Trips in the last year and the time for Technical Education (Theory) in the curriculum, suggest that these two tended to be found in the same programs.

The correlation of -0.317 for institutes, between the time for Field Trips in the last year and the time for Technology (Practical) in the first year, suggests a time competition for technical programs at institutes between Field Trips and the content in this practical curriculum element. The correlation between the same variables for agricultural colleges was plus 0.738, which suggests a different view of one of these variables at the two categories of institution.

III. STATISTICS ON CURRICULUM ELEMENTS

Distribution of Instructional Time Among Curriculum Elements

Table XXVI shows a breakdown of the curriculum according to the time assigned to each element in per cent of the total time for first and last year programs. The elements used were: (1) Technical Education (Theory), (2) Technical Education (Practical), (3) Technology (Theory), (4) Technology (Practical), and, (5) General

TABLE XXV

PER CENT FIELD TRIPS IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

Mean Per Cent of Time	0.69	0.62	0.0	0.65
Standard Deviation	1.31	1.65	0.0	1.35
Paired With Variable	Correlation Coefficients			
Field Trips First Year (XXIV)[a]	0.848[b]	1.000	c	0.885
Technical Education (Theory) First Year (XXVII)	0.382	-0.119	c	0.278
Technology (Practical) First Year (XXXIII)	-0.317	0.738	c	-0.130

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

TABLE XXVI

DISTRIBUTION OF INSTRUCTIONAL TIME AMONG CURRICULUM ELEMENTS BY PER CENT OF TOTAL TIME

	Institutes		Agricultural Colleges		Junior Colleges		College System	
Year of Program	First	Last	First	Last	First	Last	First	Last
Number of Programs	49	45	11	8	7	2	67	55
Technical Education (Theory)	26.2	18.1	19.6	18.1	12.4	10.0	23.7	17.8
Technical Education (Practical)	11.4	7.6	20.6	16.0	14.3	12.5	13.2	9.0
Technology (Theory)	26.0	30.8	30.3	35.0	27.9	45.0	26.9	31.9
Technology (Practical)	32.2	39.6	24.1	26.9	30.6	25.0	30.7	37.2
General Education	4.2	4.2	6.5	4.0	16.4	7.5	5.9	4.3
Sub Total: Theory	52.2	48.9	49.9	53.1	40.3	55.0	50.6	49.7
Sub Total: Practical	43.6	47.2	44.7	42.9	44.9	37.5	43.9	46.2
Sub Total: Technical Education	37.6	25.7	40.2	34.1	26.7	22.5	36.9	26.8
Sub Total: Technology	58.2	70.4	54.4	61.9	58.5	70.0	57.6	69.1

Education. The table also gives the sub-totals obtained by adding two of the appropriate elements for: both aspects of Theory, both aspects of Practical, both aspects of Technical Education, and both aspects of Technology.

When the sub-totals were examined to determine where the time emphasis was placed, it was noted that for the college system Technology had priority with 57.6 per cent,[2] followed by Theory with 50.6 per cent, Practical with 43.9 per cent, and Technical Education with 36.9 per cent. The same priority was indicated for institutes, agricultural colleges, and junior colleges for both first and last year programs. Approximately five per cent of curriculum time was assigned to General Education. More time was given to General Education in junior colleges than elsewhere and, for the system, more time was given to General Education in first year than in last year programs.

When curriculum elements shown in Table XXVI were examined, it was noted that with one exception, Technical Education decreased in the time assigned to it from first year to last year programs, and Technology received more time in last year programs. The exception was that more time was assigned to Technology (Practical) in first than in last years at junior colleges.

Per Cent Technical Education (Theory) in First Year

Table XXVII gives statistics relating to Technical Education

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[2]Since each of the four elements was counted twice and General Education was not counted, the figures given do not add to one-hundred per cent.

TABLE XXVII

PER CENT TECHNICAL EDUCATION (THEORY) IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	26.24	19.54	12.43	23.70
Standard Deviation	11.53	11.17	10.47	12.25
Paired With Variable	Correlation Coefficients			
Length in Years (I)	0.296	-0.296	-0.075	0.132
Enrolment First Year (VI)	0.057	0.515	-0.809	0.167
Lecture-Demonstration First Year (X)	0.375	0.416	-0.478	0.320
Lecture-Demonstration Last Year (XI)	0.383	0.162	-1.000	0.299
Work Experience First Year (XVI)	0.006	-0.014	0.840	0.093
Group Aides First Year (XVIII)	0.226	-0.019	0.756	0.168
Group Aides Last Year (XIX)	0.302	-0.422	1.000	0.228
Student Participation First Year (XX)	-0.175	0.141	-0.345	-0.290
Student Participation Last Year (XXI)	-0.006	-0.220	-1.000	-0.340
Individualized Aides First Year (XXII)	-0.158	0.638	0.897	0.060
Field Trips Last Year (XXV)	0.382	-0.119	0.0	0.278
Technical Education (Theory) Last Year (XXVIII)	0.357	0.870	1.000	0.468
Technical Education (Practical) First Year (XXIX)	0.096	0.198	0.793	0.113
Technology (Theory) First Year (XXXI)	-0.496	-0.527	-0.703	-0.506
Technology (Theory) Last Year (XXXII)	0.463	-0.793	-1.000	0.029
Technology (Practical) First Year (XXXIII)	-0.601	-0.657	-0.460	-0.468
Technology (Practical) Last Year (XXXIV)	-0.443	-0.399	-1.000	-0.299
General Education First Year (XXXV)	-0.216	0.213	-0.649	-0.333

(Theory) in first year programs. The mean per cent of time assigned to this element in first year for the college system was 23.7, ranging from a high of 26.2 per cent at institutes to a low of 12.4 per cent at junior colleges.

Correlations of 0.357 for institutes, 0.870 for agricultural colleges, and 0.468 for the college system between the time for Technical Education (Theory) in first and last years, suggest that there was a strong tendency for programs to maintain the proportion of this element from one year of a program to another.

The correlations of -0.496 for institutes and -0.468 for the college system, between the time for Technical Education (Theory) in first year and the time for Technology (Theory) in first year, suggest that emphasis on one of these tended to de-emphasize the other.

The correlations of 0.463 for institutes and -0.793 for agricultural colleges, between time for Technical Education (Theory) in first year and Technology (Theory) in last year, suggest that these two elements tended to reinforce at institutes but to compete at agricultural colleges.

Negative correlations were observed between the time for Technical Education (Theory) in first year and Technology (Practical) for both first and last years at institutes and for the college system, and for the first year at agricultural colleges. These correlations suggest that programs that emphasized one of these aspects of curriculum tended to de-emphasize the other aspect.

The correlation of -0.333 for the college system, between the time for Technical Education (Theory) in first year and General Education in first year, suggests that programs emphasizing this theory aspect tend to de-emphasize General Education.

Per Cent Technical Education (Theory) in Last Year

The time that was allocated to Technical Education (Theory) in the last year is shown in Table XXVIII. The mean time for the college system was 17.8 per cent, ranging from a high of 18.1 per cent at institutes and agricultural colleges to 10.0 per cent at junior colleges. There was only slightly less time given to this element in the second year for agricultural colleges and junior colleges, but at institutes there was considerably less time for this element in the last year. This suggests that institutes may have tended to place the more abstract theory early in the program and the other institutions tended to distribute this material more uniformly throughout the program.

Correlations of 0.457 for institutes and 0.458 for the college system, between the time for Technical Education (Theory) in the last year and Technical Education (Practical) in the last year, suggest a matching of theory and practice rather than a competition for time.

The correlation of -0.331 for the college system, between the time for Technical Education (Theory) in the last year and Technology (Theory) in the first year, suggests that programs tended to have one or the other of these elements emphasized. The correlations of -0.742

TABLE XXVIII

PER CENT TECHNICAL EDUCATION (THEORY) IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	18.07	18.12	10.00	17.78
Standard Deviation	11.02	12.73	10.00	11.35
Paired With Variable	Correlation Coefficients			
Enrolment Last Year (VII)[a]	-0.320[b]	0.886	c	-0.215
Lecture-Demonstration Last Year (XI)	0.421	0.432	c	0.398
Laboratory Last Year (XIII)	-0.106	-0.756	c	-0.116
Work Experience First Year (XVI)	0.301	0.394	c	0.311
Student Participation First Year (XX)	-0.404	-0.256	c	-0.408
Technical Education (Theory) First Year (XXVII)	0.357	0.870	c	0.468
Technical Education (Practical) Last Year (XXX)	0.457	0.592	c	0.458
Technology (Theory) First Year (XXXI)	-0.243	-0.530	c	-0.332
Technology (Theory) Last Year (XXXII)	-0.024	-0.742	c	-0.242
Technology (Practical) Last Year (XXXIV)	-0.764	-0.674	c	-0.685
Role of the Graduate (XXXVII)	-0.288	0.0	c	-0.285

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

for agricultural colleges and -0.242 for the college system, between the time for Technical Education (Theory) in the last year and Technology (Theory) in the last year, suggest a similar either-or pattern for these two elements having emphasis in the curriculum.

The correlations of -0.764 for institutes and -0.685 for the college system, between the time for Technical Education (Theory) in the last year and Technology (Practical) in the last year, suggest a theory-practice division with time tending to be assigned to one or the other.

The correlation of -0.285 for the college system, between the time for Technical Education (Theory) in the last year and the role of the graduate, suggests that this theory element was associated with the support role to a professional and programs minimizing theory tended to prepare graduates for job performance.

Per Cent Technical Education (Practical) in First Year

Statistics relating to the time for Technical Education (Practical) in the first year are shown in Table XXIX. The mean time for this curriculum element in the college system was 13.2 per cent ranging from 20.6 per cent at agricultural colleges to 11.4 per cent at institutes.

All categories of institutions had more Technical Education (Practical) in first year than in last year programs. The correlations of 0.322 for institutes, 0.933 for agricultural colleges, and 0.485 for the college system, between the time for this element in first and last years, suggest consistency in the time assigned for

TABLE XXIX

PER CENT TECHNICAL EDUCATION (PRACTICAL) IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	11.39	20.54	14.29	13.19
Standard Deviation	8.73	14.87	14.74	11.23
Paired With Variable	Correlation Coefficients			
Hours Per Week (VIII)[a]	<u>-0.409</u>[b]	0.166	0.202	0.032
Lecture-Demonstration First Year (X)	-0.121	-0.548	-0.506	<u>-0.281</u>
Shop First Year (XIV)	0.073	0.210	<u>0.889</u>	0.212
Work Experience First Year (XVI)	-0.108	0.255	<u>0.963</u>	0.104
Technical Education (Theory) First Year (XXVII)	0.096	0.198	<u>0.793</u>	0.113
Technical Education (Practical) Last Year (XXX)	<u>0.322</u>	<u>0.933</u>	1.000	<u>0.485</u>
Technology (Theory) First Year (XXXI)	<u>-0.526</u>	<u>-0.806</u>	-0.570	<u>-0.544</u>
Technology (Theory) Last Year (XXXII)	-0.139	<u>-0.791</u>	-1.000	<u>-0.297</u>
Technology (Practical) First Year (XXXIII)	<u>-0.545</u>	-0.181	-0.713	<u>-0.530</u>

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

particular programs.

The pattern of correlations between Technical Education (Practical) in first year on the one hand and both first and last years for Technology (Theory) on the other hand, since they were negative in each case, suggests time competition between Technical Education and Technology, or, between practical and theory or both.

The correlations of -0.545 for institutes and -0.530 for the college system, between time for Technical Education (Practical) in first year and Technology (Practical) in first year, suggest time competition between Technical Education and Technology.

Per Cent Technical Education (Practical) in Last Year

Table XXX displays statistics relating to the time assigned to Technical Education (Practical) in the last year. This element was reported to account for 16.0 per cent at agricultural colleges, 12.5 per cent at junior colleges, and 7.6 per cent at technical institutes. The mean for the college system was 9.0 per cent.

Correlations of -0.779 and -0.872 for agricultural colleges, between the time for Technical Education (Practical) in last year and Technology (Theory) in first and last years respectively, suggest that programs assigned substantial time for one element tended to have minimal time assigned for the other. The correlation of -0.356 for the college system, between the time for Technical Education (Practical) in last year and Technology (Theory) in last year, suggests that the pattern indicated above for agricultural colleges

TABLE XXX

PER CENT TECHNICAL EDUCATION (PRACTICAL) IN LAST YEAR
AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	7.64	16.00	12.50	9.04
Standard Deviation	6.75	10.52	12.50	8.25
Paired With Variable	Correlation Coefficients			
Hours Per Week (VIII)[a]	<u>-0.325</u>[b]	-0.333	c	<u>-0.287</u>
Individualized Aides First Year (XXII)	-0.075	0.536	c	<u>0.373</u>
Individualized Aides Last Year (XXIII)	0.071	0.433	c	<u>0.365</u>
Technical Education (Theory) Last Year (XXVIII)	<u>0.457</u>	0.592	c	<u>0.458</u>
Technical Education (Practical) First Year (XXIX)	<u>0.322</u>	<u>0.933</u>	c	<u>0.485</u>
Technology (Theory) First Year (XXXI)	-0.106	<u>-0.779</u>	c	-0.180
Technology (Theory) Last Year (XXXII)	-0.221	<u>-0.872</u>	c	<u>-0.356</u>
Technology (Practical) Last Year (XXXIV)	<u>-0.461</u>	-0.203	c	<u>-0.455</u>

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

was replicated for the system in the last year.

The correlations of -0.461 for institutes and -0.455 for the college system, between the time for Technical Education (Practical) in the last year and Technology (Practical) in the last year, suggest that these two elements were competitive for time rather than supportive.

Per Cent Technology (Theory) in First Year

Statistics relating to the time for Technology (Theory) in the first year are shown in Table XXXI. The mean time assigned to this element for the college system was 26.9 per cent. There was only slight variation between categories of institutions with institutes reporting a mean of 26.0 per cent, agricultural colleges 30.3 per cent, and junior colleges an intermediate 27.9 per cent.

Correlations of 0.922 for agricultural colleges and 0.449 for the college system, between the time for Technology (Theory) in first and last years, suggest that these colleges were more consistent in using this element throughout programs than were institutes. The correlation for institutes was small and positive.

Per Cent Technology (Theory) in Last Year

Table XXXII displays statistics relating to the time for Technology (Theory) in the last year. Junior college supervisors reported 45.0 per cent, with 35.0 per cent at agricultural colleges and 30.8 per cent at technical institutes. The mean for the college system was 31.9 per cent.

TABLE XXXI

PER CENT TECHNOLOGY (THEORY) IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	26.00	30.27	27.86	26.90
Standard Deviation	9.11	15.72	11.15	10.81
Paired With Variable	Correlation Coefficients			
Weeks Per Year (II)[a]	<u>0.388</u>[b]	-0.326	-0.182	-0.028
Enrolment First Year (VI)	<u>0.311</u>	-0.241	0.699	0.156
Enrolment Last Year (VII)	<u>0.368</u>	-0.562	0.0	0.154
Hours Per Week (VIII)	<u>0.289</u>	-0.502	-0.482	-0.178
Lecture-Demonstration First Year (X)	0.278	0.396	0.459	<u>0.320</u>
Shop First Year (XIV)	<u>-0.307</u>	-0.014	-0.446	<u>-0.247</u>
Shop Last Year (XV)	<u>-0.323</u>	-0.266	0.0	-0.212
Student Participation First Year (XX)	-0.092	-0.059	<u>0.775</u>	0.153
Student Participation Last Year (XXI)	-0.107	0.057	1.000	<u>0.323</u>
Technical Education (Theory) First Year (XXVII)	<u>-0.496</u>	-0.527	-0.703	<u>-0.506</u>
Technical Education (Theory) Last Year (XXVIII)	-0.243	-0.530	1.000	<u>-0.332</u>
Technical Education (Practical) First Year (XXIX)	<u>-0.526</u>	<u>-0.806</u>	-0.570	<u>-0.544</u>
Technical Education (Practical) Last Year (XXX)	-0.106	<u>-0.779</u>	-1.000	-0.180
Technology (Theory) Last Year (XXXII)	0.122	<u>0.922</u>	1.000	<u>0.449</u>

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

TABLE XXXII

PER CENT TECHNOLOGY (THEORY) IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	30.76	35.00	45.00	31.89
Standard Deviation	11.67	17.85	15.00	13.21
Paired With Variable	Correlation Coefficients			
Length in Years (I)[a]	0.353[b]	0.0	c	0.228
Weeks Per Year (II)	-0.222	-0.344	c	-0.287
Enrolment First Year (VI)	0.413	-0.385	c	0.241
Lecture-Demonstration First Year (X)	0.476	-0.057	c	0.365
Lecture-Demonstration Last Year (XI)	0.542	0.270	c	0.469
Work Experience Last Year (XVII)	-0.354	-0.699	c	-0.365
Group Aides Last Year (XIX)	0.401	0.382	c	0.292
Student Participation Last Year (XXI)	0.114	-0.031	c	0.297
Technical Education (Theory) First Year (XXVII)	0.463	-0.793	c	0.029
Technical Education (Theory) Last Year (XXVIII)	-0.024	-0.742	c	-0.242
Technical Education (Practical) First Year (XXIX)	-0.139	-0.791	c	-0.297
Technical Education (Practical) Last Year (XXX)	-0.221	-0.872	c	-0.356
Technology (Theory) First Year (XXXI)	0.122	0.922	c	0.449
Technology (Practical) Last Year (XXXIV)	-0.504	0.117	c	-0.399
General Education First Year (XXXV)	-0.328	0.186	c	-0.089

[a]Refers to table number

[b]Underlined coefficeint, probability less than .05

[c]Coefficient considered unreliable

Correlations of -0.504 for institutes and -0.399 for the system, between the time for Technology (Theory) in the last year and the time for Technology (Practical) in the last year, suggest a theory-practice dichotomy.

The correlation of -0.328 for institutes, between the time for Technology (Theory) in the last year and General Education in the first year, suggests that General Education was not emphasized where Technology (Theory) was emphasized.

Per Cent Technology (Practical) in First Year

Data for Technology (Practical) in first year are shown in Table XXXIII. The mean time assigned to this curriculum element was 30.7 per cent for the college system, ranging from 24.1 per cent at agricultural colleges to 32.2 per cent at technical institutes.

Correlations of 0.332 for institutes, 0.849 for agricultural colleges and 0.407 for the college system, between the time for Technology (Practical) in first and last years, suggest consistency in the use of this element within programs.

Per Cent Technology (Practical) in Last Year

Table XXXIV provides data relating to the time for Technology (Practical) in the last year. The mean time for this curriculum element for the college system was 37.2 per cent in last year programs. For institutes more time in the last year programs was given to this element than was given to any other. This was not the case for agricultural and junior colleges where more time was

TABLE XXXIII

PER CENT TECHNOLOGY (PRACTICAL) IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	32.24	24.09	30.57	30.73
Standard Deviation	11.05	9.96	17.09	12.04
Paired With Variable	Correlation Coefficients			
Years Offered (III)[a]	0.321[b]	-0.144	0.401	0.228
Hours Per Week (VIII)	0.367	-0.009	0.167	0.139
Lecture-Demonstration First Year (X)	-0.379	-0.554	0.283	-0.277
Lecture-Demonstration Last Year (XI)	-0.257	-0.643	1.000	-0.301
Laboratory First Year (XII)	0.159	0.274	0.695	0.311
Shop First Year (XIV)	0.367	0.288	-0.576	0.192
Shop Last Year (XV)	0.407	0.014	0.0	0.343
Field Trips First Year (XXIV)	-0.192	0.664	0.0	0.009
Field Trips Last Year (XXV)	-0.317	0.738	0.0	-0.130
Technical Education (Theory) First Year (XXVII)	-0.601	-0.657	-0.460	-0.468
Technical Education (Practical) First Year (XXIX)	-0.545	-0.181	-0.713	-0.530
Technology (Practical) Last Year (XXXIV)	0.332	0.849	1.000	0.407

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

TABLE XXXIV

PER CENT TECHNOLOGY (PRACTICAL) IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	39.58	26.87	25.00	37.20
Standard Deviation	18.33	11.97	5.00	17.95
Paired With Variable	Correlation Coefficients			
Weeks Per Year (II)[a]	0.330[b]	-0.463	c	0.294
Lecture-Demonstration First Year (X)	-0.288	-0.754	c	-0.333
Lecture-Demonstration Last Year (XI)	-0.630	-0.814	c	-0.614
Laboratory First Year (XII)	0.283	0.562	c	0.357
Work Experience Last Year (XVII)	0.450	0.154	c	0.429
Group Aides Last Year (XIX)	-0.391	0.559	c	-0.323
Student Participation First Year (XX)	0.472	0.570	c	0.258
Technical Education (Theory) First Year (XXVII)	-0.443	-0.399	c	-0.299
Technical Education (Theory) Last Year (XXVIII)	-0.764	-0.674	c	-0.685
Technical Education (Practical) Last Year (XXX)	-0.461	-0.203	c	-0.455
Technology (Theory) Last Year (XXXII)	-0.504	0.117	c	-0.399
Technology (Practical) First Year (XXXIII)	0.332	0.849	c	0.407
General Education Last Year (XXXVI)	-0.174	0.712	c	-0.223
Role of the Graduate (XXXVII)	0.326	0.0	c	0.316

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

given to Technology (Theory) in last year programs than to any other element. This pattern suggests emphasis on theory at the colleges and emphasis on practical training at institutes.

The correlation of 0.712 for agricultural colleges, between the time for Technology (Practical) in the last year and General Education in the last year, suggests that these two curriculum elements tended to get similar kinds of emphasis in their programs.

Correlations of 0.326 for institutes and 0.316 for the college system, between the time for Technology (Practical) in the last year and the role of the graduate, suggest that programs that gave substantial curriculum time to Technology (Practical) in the last year tended to prepare graduates for the role of job competence.

Per Cent General Education in First Year

Table XXXV provides data relating to the time for General Education in first year programs. The mean time for General Education in first year programs for the college system was 5.9 per cent. There was little variation between program emphasis in one category of institution and another except for junior colleges where the mean time for this element was 16.4 per cent.

Correlations of 0.543 for institutes, 0.753 for agricultural colleges, and 0.583 for the college system, between the time for General Education in first and last years, suggest that General Education time assignment was consistent within programs from one year to another.

The correlation of 0.615 for agricultural colleges, between

TABLE XXXV

PER CENT GENERAL EDUCATION IN FIRST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Per Cent of Time	4.20	6.45	16.43	5.85
Standard Deviation	5.39	7.34	10.51	7.44
Paired With Variable	Correlation Coefficients			
Weeks Per Year (II)[a]	-0.015	0.655[b]	0.482	0.144
Options (IV)	-0.322	0.088	0.586	-0.002
Enrolment First Year (VI)	-0.326	0.064	0.653	-0.264
Lecture-Demonstration First Year (X)	-0.340	0.483	-0.021	-0.174
Work Experience Last Year (XVII)	0.325	-0.253	-1.000	0.237
Student Participation First Year (XX)	0.455	0.397	0.589	0.593
Student Participation Last Year (XXI)	0.109	-0.351	1.000	0.307
Technical Education (Theory) First Year	-0.216	0.213	-0.649	-0.333
Technology (Theory) Last Year (XXXII)	-0.328	0.186	1.000	-0.089
General Education Last Year (XXXVI)	0.543	0.753	1.000	0.583
Role of the Graduate (XXXVII)	-0.047	0.615	0.276	0.192

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

time for General Education in the first year and the role of the graduate, suggests that agricultural colleges tended to prepare students for the role of job competence in programs having a relatively large proportion of the time for General Education.

Per Cent General Education in Last Year

Table XXXVI shows statistics relating to the time for General Education in last year programs. The mean time for General Education for the college system decreased slightly in last year from first year to 4.3 per cent. The time assigned was 4.0 per cent in agricultural colleges, 4.2 per cent in technical institutes, and 7.5 per cent in junior colleges. Correlations with other variables have been discussed previously.

IV. STATISTICS ON THE ROLE OF THE GRADUATE

The last question on the questionnaire required the respondent to circle one number in a one-to-five scale. Number one indicated that the graduate's role was perceived to be assistance to a professional, number five indicated that the graduate's role was perceived to be job competence, and number three was both. All respondents completed this question. Forty-nine responses indicated both roles, fifteen responses were more than three or tended toward job competence, and three responses were less than three or tended toward assistance to a professional.

The Role of the Graduate

Table XXXVII provides data on the responses to the question on

TABLE XXXVI

PER CENT GENERAL EDUCATION IN LAST YEAR AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=45)	Agri. Colleges (N=8)	Junior Colleges (N=2)	College System (N=55)
Mean Per Cent of Time	4.18	4.00	7.50	4.27
Standard Deviation	4.87	4.69	2.50	4.82
Paired With Variable	Correlation Foefficients			
Entrance Requirements (V)[a]	-0.186	0.739[b]	c	0.077
Student Participation Last Year (XXI)	0.325	-0.149	c	0.242
Technology (Practical) Last Year (XXXIV)	-0.174	-0.712	c	-0.223
General Education First Year (XXXV)	0.543	0.753	c	0.583

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

[c]Coefficient considered unreliable

TABLE XXXVII

THE ROLE OF THE GRADUATE CODE AND ASSOCIATIONS WITH OTHER VARIABLES

	Institutes (N=49)	Agri. Colleges (N=11)	Junior Colleges (N=7)	College System (N=67)
Mean Code for Role of the Graduate	3.20	3.27	3.71	3.27
Standard Deviation	0.81	0.62	0.88	0.80
Paired With Variable	Correlation Coefficients			
Weeks Per Year (II)[a]	-0.323[b]	0.504	0.445	-0.057
Options (IV)	0.303	-0.237	0.564	0.254
Shop Last Year (XV)	0.323	0.0	0.0	0.281
Student Participation First Year (XX)	0.184	0.150	0.455	0.292
Individualized Aides Last Year (XXIII)	0.422	0.0	-1.000	0.192
Technical Education (Theory) Last Year (XXVIII)	-0.288	0.0	-1.000	-0.285
Technology (Practical) Last Year (XXXIV)	0.326	0.0	1.000	0.316
General Education First Year (XXXV)	-0.047	0.615	0.276	0.192

[a]Refers to table number

[b]Underlined coefficient, probability less than .05

the role of the graduate. The mean response for the college system was 3.27 with institutes slightly lower than this and junior colleges higher than this. These numbers suggest that junior colleges were directing their efforts to preparing graduates for job performance to a greater extent than were other categories of institutions.

V. SUMMARY OF RESULTS

The "Statistical" Program

The means given for the variables considered, if used to produce the profile of an artificial program in The Alberta College System, would define a program with the following characteristics.

The program, which was originally established in September of 1960, was 2.19 years in length with 32.77 weeks of instruction yearly. There was almost no provision for options and entrance requirements were between one-hundred High School credits and a High School Diploma. There were thirty-nine students in the first year and twenty students in the last year of the program.

There were, based on Table IX, approximately thirty hours of instruction weekly which was distributed as follows. The instructors were speaking for just over fourteen hours in first year and just under fourteen hours in the last year of the program. Of the remaining sixteen hours ten were assigned to laboratory instruction, and approximately four were assigned to Shop or Work Experience. Two hours were used for group or individualized instructional aides, or for student participation in instruction.

If the curriculum was divided into aspects of theory, practice, and general education, then the respective times assigned to each was fifteen hours, fourteen hours and one hour.

The work role for which the student was being prepared was not exclusively support to a professional or competence in job performance, but a combination of both. It is emphasized that the above description implies over simplification.

CHAPTER V

CONCLUSIONS, QUESTIONS AND SUGGESTIONS

The major conclusion that might follow from the result of this study is that major institutionalized patterns for technical education did not emerge. The aim of describing technical programs would have been more adequately accomplished if unifying patterns were more prominent. It is prudent to make the follwing reservation. The institutions offering the programs considered have been collectively designated "The Alberta College System" only since early in 1969 when legislation was enacted, and elements in the system will not come under a central administrative authority for some years. The following comment is provided with the intent that it might prove helpful to future researchers investigating technical programming. Many minor patterns were implied in the chapter giving results. Some of these might serve as the starting point for other studies. The lack of major patterns in programming invites comment and hypotheses.

The Institutional Approach to Program Study

The differences between programs within institutions may have been much greater than the differences of program patters between categories of institutions. Three possible methods of investigation that might have been followed were: first, to compare particular programs with all other programs; second, to compare programs in one

institution with programs in another institution of the same category; and third, to compare programs in categories of institutions. This last was the approach used in this study.

Philosophies and Activities

A different line of thought that could explain the lack of patterns inherent in the result of this study might be tentatively stated as follows. Philosophies for technical education have not been constructed, accepted or articulated to a sufficient degree that a pattern was imposed on activity. This would imply that however technical programming was directed, it was not directed through adherence to some philosophical principles of technical education held by those guiding technical education in Alberta.

Loyalties and Affiliations of Technical Educators

The program activity in technical education may have been directed more by the professional affiliations and loyalties to employment areas on the part of individual instructors than it was directed by the administrators of institutions. In this regard, the place of advisory committees composed of employers is noted. A value judgement about the desirability of one kind of direction over another is not implied even though there are implications flowing from this possibility. First, if the direction of technical education is through the professionalism or other loyalty of instructors then attempts to impose direction on the program activities will tend to be frustrated. Second, the time required to change loyalties is very

substantial and as a consequence, technical education directed in this way might not be capable of adequately responding to technological change.

Technical Education or Technical Training?

Possibly the educational expertise of technical educators, regardless of level or quality, may be relatively unimportant to the acceptability or otherwise of technical programs to potential students. The important factor may be the single-minded approach to getting youth into desirable employment. If this ability to assure employability is "the" major strength of the technical program, then the multiplicity of programs developed in the last decade based on business, communications, and the social sciences will be successful to the extent that this employability is assured. It may be risky to develop programs modelled on technical programs as regards length and level unless a job market is established for graduates. Programs lacking the discipline of employability may attempt to replace it with other principles. Traditionally, these other guiding principles have included: emphasis on instructional methodology, the development of psycho-motor skills, the personal development of students, and general education. The question: Education or training? may be academic. Possibly better questions are: Passive or active? Abstract or concrete? Consumer or producer?

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APPENDIX A

Clark Tingley
Department of Educational Administration
University of Alberta, Edmonton

March 1969

Re: TECHNICAL PROGRAMS IN THE ALBERTA COLLEGE SYSTEM

The undersigned, presently in the master's program, Educational Administration, University of Alberta, is on leave from the Alberta Division of Vocational Education as Supervisor of Program Development and is committed to return to that position, consequently interest in programs is both immediate and continuing.

The purpose of the study, ititled, TECHNICAL EDUCATION PROGRAMS IN THE ALBERTA COLLEGE SYSTEM, is to identify and describe the technical programs offered in the 1968-69 academic year by the Public Junior Colleges, the Colleges of Agriculture, and the Technical Institutes. There are three aims; (1) to tabulate data from the attached questionnaire and thus give an abbreviated description of the program, (2) to identify the instructional methodologies employed, and (3) to classify elements in the program according to five purposes.

The following definitions will be used. "Academic year" means a major part of the interval between successive summer vacation periods regardless of any further division into quarters or semesters. "First year" means the beginning year in a technology program including Year A of the articulated technologies, but excluding a pre-technology year. "Program" includes all the subjects that a particular student would take, including options, to qualify for a particular certificate or diploma. "Technical program" means a program offered by a public junior college, a college of agriculture, or an institute of technology that is from one to three years long, that is based on one of the sciences or mathematics, and is directed toward a specific employment area or role.

It is anticipated that question #13 on methodology and #14 on program elements will be most troublesome. It is not asked that a major effort be made to categorize these, rather, an opinion using the concepts on the questionnaire is preferred.

As a matter of interest it is not intended to evaluate the programs on any kind of basis. The result is intended to be descrip-

. . . . 2

tive. A copy of the result will be provided to the library of cooperating institutions.

This is to request your assistance and ask that you complete the attached questionnaire. Your name will not appear on the result, however, it is intended to identify programs by name and location. If your department conducts more than one program, then, one of these questionnaires should be completed for each.

Thank you.

(Clark Tingley)

QUESTIONNAIRE: PROGRAM SUPERVISOR

Note: It is intended that the following questions be answered by the person most closely associated with supervising the program.

1. The following information relates to:

   (name of program) ________________________________

   (name of department) ________________________________

   (name of institution) ________________________________

2. The number of years required to complete this program is: one ( ), two ( ), three ( ).

3. The program is in session for approximately ___ weeks each year.

4. This, or a very similar program has been offered continuously here since 19__. Remarks ________________________________.

5. There are optional parts in this program. Yes ( ), No ( ).

6. If the answer to #5 was yes, then the optional parts consist of optional courses ( ), optional programs past the initial year ( ), both optional courses and optional programs ( ). Remarks ______

   ____.

7. To be accepted into the first year of this program a student must meet the following entrance requirements ________________

   ____

   ____

8. The number of students beginning the first year program in the fall of 1968 was ____ (Year 1 or Year A).

9. The number of students beginning the second year program in the fall of 1968 was ____ (Year 2 or Year B).

10. The number of students beginning the third year program in the fall of 1968 was ____ (Year 3 or Year C).

11. The number of students the registrar was authorized to accept in various years of the program in the fall of 1968 was: ___ students in first year, ___ students in second year, and, ___ students in third year. If organized on other than a year basis give an

equivalent average figure and explain in remarks ________.

12. The number of hours per week of scheduled instruction was: ____ hours per week in first year, ____ hours per week in second year, and ____ hours per week in third year.

13. The instructional methods employed for this program this year are estimated to have the following time percentages:

	Year 1	Year 2	Year 3
a) lecture-demonstration (instructor speaking)	___%	___%	___%
b) laboratory exercises	___%	___%	___%
c) shop exercises	___%	___%	___%
d) simulated work experience (on campus) . . .	___%	___%	___%
e) on-the-job experience (usually off campus).	___%	___%	___%
f) group instruction using film, instructional TV, etc.	___%	___%	___%
g) student participation (seminar, panel, case study, etc.)	___%	___%	___%
h) individualized instruction (programs, single concept film, teaching machines, etc.)	___%	___%	___%
i) other (specify) ______________________	___%	___%	___%
j) other (specify) ______________________	___%	___%	___%
	100%	100%	100%

14. To answer the next question the program content must be divided among the five underlined categories in the following material.

Technical education (theory) includes such background academic matter as is typically found in courses in physics, chemistry, mathematics, biology, communications, and graphics.

Technical education (practical) includes the laboratory and other exercises used to reinforce the theory indicated above.

Questionnaire - page three

Technology (theory) would usually be given by an instructor from the student's home department and includes, for example, lectures in chemistry to chemical technology, theory of transistors to electronic technology, and theory of blood typing to medical laboratory technology.

Technology (practical) consists of the practical exercises used to give understanding of the theory above as well as the development of skills, techniques, and procedures. This includes, for example, most of the laboratory work for chemical technology, using transistors in circuits for electronic technology, and motor work for automotive service technology.

General education includes courses in literature, philosophy, industrial sociology, geography, psychology, and many others.

In this program the instructional time given to these elements is approximately as follows:

	Year 1	Year 2	Year 3
a) technical education (theory)	____%	____%	____%
b) technical education (practical)	____%	____%	____%
c) technology (theory)	____%	____%	____%
d) technology (practical)	____%	____%	____%
e) general education.	____%	____%	____%
	100%	100%	100%

15. Two views of the role of a technician are often expressed. One view is that technicians have a support role to a professional. Another is that a technician should work independently in a job. Circle the number in the 1 - 5 scale to indicate where you see graduates of your program on this scale.

1	2	3	4	5
(assist professional)		(both)		(do a job)

Please return this completed form to:

Clark Tingley
Department of Educational Administration
University of Alberta, Edmonton

APPENDIX B

(COPY)

Clark Tingley
Department of Educational Administration
University of Alberta
Edmonton, Alberta
April 10, 1969

Dr. W. B. Pentz, President
Mount Royal Junior College
Calgary, Alberta

TECHNICAL PROGRAMS IN THE ALBERTA COLLEGE SYSTEM:
A DESCRIPTIVE STUDY

This refers to a recent letter from Dr. H. Kolesar, on my behalf, in which he indicated to you some interest in my study on "technical programs" in Alberta.

Attached are: (1) a questionnaire form which, it is hoped, will eventually be completed by all program supervisors in Alberta but which is included here only for your information, and, (2) a letter which will accompany each questionnaire containing instructions and definitions.

Briefly, a "technical program" must have all of the following characteristics:

1. it must be offered by a public junior college, a college of agriculture, or an institute of technology,

2. it must be from one to three years in length,

3. it must be based on one of the (non-social) sciences or mathematics, and,

4. it must be directed toward a specific employment area or role.

This letter is to ask for your cooperation in gathering information from your program supervisors using the questionnaire, and, to request your assistance in identifying the programs, if any, that fit the above definition.

My specific request is for a list of the programs that would meet this definition of "technical program" or if this is not easily established, the designation of one of your staff members whom I might work with to establish which programs have the above characteristics.

It is hoped that this information might be gathered before classes cease this spring. Your attention to this matter is appreciated.

Yours truly,

(Clark Tingley)

APPENDIX C

TAPLE XXXVIII

PROGRAMS REPORTED BY THE STUDY

Program Number	Institution	Program Name
01	NAIT[a]	Air Conditioning and Refrigeration Technology
02	NAIT	Architectural Technology
03	NAIT	Biological Sciences Technology
04	NAIT	Building Construction Technology
06	NAIT	Chemical Technology
07	NAIT	Chemical Research Technology
08	NAIT	Civil Technology
09	NAIT	Computer Systems Technology
14	NAIT	Electrical Technology (two years)
15	NAIT	Electronics Technology
16	NAIT	Exploration Technology
17	NAIT	Food Processing Technology
19	NAIT	Gas Technology
20	NAIT	Heavy Duty Equipment Technology
21	NAIT	Industrial Production Technology
22	NAIT	Instrumentation Technology
24	NAIT	Medical Laboratory Technology
28	NAIT	Radio and TV Service Technician
29	NAIT	Respiratory Technology
31	NAIT	Surveying Technology
32	NAIT	Electrical Technology (three years)
36	SAIT[b]	Aeronautical Engineering Technology
37	SAIT	Air Conditioning and Refrigeration Technology
38	SAIT	Aircraft Maintenance Technology
39	SAIT	Architectural Technology (two years)
40	SAIT	Architectural Technology (three years)
41	SAIT	Automotive Service Technology
42	SAIT	Broadcast Technology
43	SAIT	Chemical Technology
44	SAIT	Chemical Technology (Biochemistry)
45	SAIT	Chemical Technology (Research)
46	SAIT	Computer Technology
47	SAIT	Diesel Mechanics (one year)
48	SAIT	Dietary Service Technology
49	SAIT	Drafting Technology (two Years)
50	SAIT	Drafting Technology (three years)

TABLE XXXVIII (continued)

Program Number	Institution	Program Name
51	SAIT	Electrical Technology (two years)
52	SAIT	Electrical Technology (three years)
53	SAIT	Electronic Technology
54	SAIT	Manufacturing Technology
55	SAIT	Mechanical Design Technology
56	SAIT	Medical Laboratory Technology
57	SAIT	Petroleum Technology
58	SAIT	Petroleum Technology (Geology)
59	SAIT	Petroleum Technology (Reservoir)
60	SAIT	Power Engineering Technology
61	SAIT	Structural Technology
62	SAIT	Surveying Technology
63	SAIT	Telecommunications Technology
68	Fairview AVC[c]	Plant Science Major
69	Fairview AVC	Soil Science Major
70	Fairview AVC	Diploma Agriculture
71	Olds AVC[d]	Agricultural General Program
72	Olds AVC	Agribusiness Technology
73	Olds AVC	Fashion and Design Technology
74	Olds AVC	Horticultural Technology
75	Olds AVC	Soil and Water Technology
76	Olds AVC	Agricultural Mechanics
77	Olds AVC	Agricultural Technology
78	Vermilion AVC[e]	Livestock Production Technology
84	Leth. Col.[f]	Architectural Technology (Year A)
85	Leth. Col.	Drafting Technology (Year A)
86	Leth. Col.	Electronic Technology (Year A)
87	Leth. Col.	Commercial Cooking
89	MRC[g]	Agribusiness
94	Red Deer Col.[h]	Business Administration Diploma
95	Red Deer Col.	Diploma Program in Nursing

[a]Northern Alberta Institute of Technology
[b]Southern Alberta Institute of Technology
[c]Fairview Agricultural and Vocational College
[d]Olds Agricultural and Vocational College
[e]Vermilion Agricultural and Vocational College
[f]Lethbridge Community College
[g]Mount Royal Community College
[h]Red Deer College

TABLE XXXIX

CONTENT OF FIELDS USED IN TABLE XL

Field	Designation
01-02	Program number
03	Institutional code
04	Number of years required to complete program
05-06	Number of weeks per year program was in session
07-08	Number of years program had been offered
09	Code for options (Appendix D)
10	Code for entrance requirements (Appendix E)
11-13	Number of students who began the first year of the program in the fall of 1968
14-16	Number of students who began the last year of the program in the fall of 1968
17-19	Number of first year students the registrar was authorized to accept in the fall of 1968
20-22	Number of last year students the registrar was authorized to accept in the fall of 1968
23-24	Number of hours per week of scheduled instruction in the first year
25-26	Per cent of time using Lecture-Demonstration in first year program
27-28	Per cent of time using Lecture-Demonstration in last year program
29-30	Per cent of time using Laboratory in first year program
31-32	Per cent of time using Laboratory in last year program
33-34	Per cent of time using Shop in first year program
35-36	Per cent of time using Shop in last year program
37-38	Per cent of time using Work Experience in first year program
39-40	Per cent of time using Work Experience in last year program
41-42	Per cent of time using Group Instructional Aides in first year program
43-44	Per cent of time using Group Instructional Aides in last year program
45-46	Per cent of time for Student Participation in first year program
47-48	Per cent of time for Student Participation in last year program
49-50	Per cent of time using Individualized Instructional Aides in first year program
51-52	Per cent of time using Individualized Instructional Aides in last year program
53-54	Per cent of time for Field Trips in first year program
55-56	Per cent of time for Field Trips in last year program

TABLE XXXIX (continued)

Field	Designation
57-58	Per cent of time for Technical Education (Theory) in first year program
59-60	Per cent of time for Technical Education (Theory) in last year program
61-62	Per cent of time for Technical Education (Practical) in first year program
63-64	Per cent of time for Technical Education (Practical) in last year program
65-66	Per cent of time for Technology (Theory) in first year program
67-68	Per cent of time for Technology (Theory) in last year program
69-70	Per cent of time for Technology (Practical) in first year program
71-72	Per cent of time for Technology (Practical) in last year program
73-74	Per cent of time for General Education in first year program
75-76	Per cent of time for General Education in last year program
77	Role of the graduate

TABLE XL

QUESTIONNAIRE RESPONSES[a]

Field																
Tens	0000	00000	11111	11111	22222	22222	33333	33333	44444	44444	55555	55555	66666	66666	77777	777
Units	1234	56789	01234	56789	01234	56789	01234	56789	01234	56789	01234	56789	01234	56789	01234	567
	0112	36051	60150	10030	01527	[illegible]	04006	05000	[illegible]	00000	10500	00252	[illegible]	[illegible]	[illegible]	[illegible]
	0213	36051	30250	36040	05028	40202	00005	00255	[illegible]	10050	00000	[illegible]	01020	[illegible]	[illegible]	[illegible]
	0312	36011	60450	21040	04030	46445	05200	00000	00000	00000	00004	04121	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	15011	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	47075	[illegible]	[illegible]	[illegible]	01000	00000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	00000	00000	00000	00351	[illegible]	[illegible]	[illegible]	[illegible]
	1513	36053	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	00000	01010	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1612	36043	60360	27040	04030	35405	00000	00000	01204	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1712	[illegible]	50050	08020	02028	53423	44000	00000	00304	08100	00002	04410	03200	[illegible]	[illegible]	[illegible]
	1912	36051	60260	20025	02528	[illegible]	[illegible]	00000	00505	00050	00002	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	00000	00502	02030	00000	00182	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	60603	53500	00000	00303	02020	00000	00301	02010	[illegible]	[illegible]	[illegible]
	[illegible]	40051	70650	75075	bbb31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4bb00	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	50420	20042	bbb30	60054	00000	00009	00000	00050	00000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3112	36021	60210	12025	bbb28	25155	06000	00252	50000	00000	00000	00404	01820	[illegible]	[illegible]	[illegible]
	3213	36031	30190	11030	03030	60604	04000	00000	00000	00000	00000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE XL (continued)

Field Tens	0000	00000	11111	11111	22222	22222	33333	33333	44444	44444	55555	55555	66666	66666	77777	777
Units	1234	56789	01234	56789	01234	56789	01234	56789	01234	56789	01234	56789	01234	56789	01234	567
	3623	30111	60380	14038	bbb30	55473	54000	00000	00705	02050	00001	03471	31006	20652	31600	003
	3722	30071	60060	08015	01530	35382	83012	04041	00604	10100	30202	02201	30000	33404	04007	073
	3822	32361	30310	21030	bbb30	30270	80855	60000	00503	01010	00001	01121	02015	13155	56000	005
	3922	30201	40250	13024	02430	20205	05520	05051	30202	04050	00000	00151	21005	15185	05510	103
	4023	30031	30250	15045	02433	20255	06020	05060	60202	02020	00000	00191	50505	14155	05512	103
	4122	32411	30320	14036	03630	45500	51510	15301	50505	05000	00000	00222	51010	25354	33000	003
	4223	32023	31600	10160	01533	65603	52500	00001	50000	00000	00000	00301	50505	30503	53000	003
	4322	30154	60660	16088	02030	47313	85800	00000	00101	12050	00402	01250	81506	23283	75800	005
	4422	30024	60660	08088	02030	47303	85900	00000	00101	12050	00402	01250	51501	23293	76500	005
	4522	30074	60660	15088	01830	47353	85400	00000	00101	12050	00402	01251	41509	23253	75200	005
	4622	36012	60480	26048	04830	45455	05000	00000	00000	05050	00000	00201	32013	24352	42512	144
	4721	32411	2036b	bb036	bbb30	38bb1	0bb10	bb405	b02bb	00bb0	0b500	bb105	b10bb	40bb4	0bb00	bb4
	4822	40011	30200	12020	bbb30	20002	50000	00209	90500	30000	00000	00110	01700	29061	99324	013
	4922	30131	40250	08024	02430	50503	13507	12100	20101	00000	00001	00303	02010	13172	73310	104
	5023	32031	30220	19036	02430	50522	54520	00000	20401	00000	00001	00362	22500	09251	84312	104
	5122	30471	40230	13025	01830	46585	03700	00000	00000	04050	00000	00232	31000	20274	03707	133
	5223	32471	30140	16030	01531	60563	64400	00000	00000	04050	00000	00252	70014	27193	63312	073
	5323	32033	31600	42160	04533	65653	53000	00000	50000	00000	00000	00302	20503	30423	53300	003
	5423	32011	30150	07030	01530	49302	04526	06000	40000	05060	00000	00211	50300	18254	54412	163
	5522	30071	60270	08038	bbb30	55553	03507	00000	10505	02030	00001	01103	74317	27321	30807	063
	5622	40001	7036b	bb036	bbb31	50bb4	5bb00	bb00b	b02bb	02bb0	1bb00	bb05b	b00bb	50bb4	5bb00	bb1
	5722	30093	60650	15060	01530	65582	02700	00101	00505	00000	00000	00412	60709	27382	02205	053
	5822	30003	60650	14060	01530	65582	02700	00101	00505	00000	00000	00412	60709	27382	02205	053
	5922	30003	60650	15060	01530	65582	02700	00101	00505	00000	00000	00412	60709	27382	02205	053
	6022	32071	60230	11024	02030	70722	22006	06000	00000	00000	00002	02352	60201	31423	23100	004

TABLE XL (continued)

Field Tens / Units	0000 1234	00000 56789	11111 01234	11111 56789	22222 01234	22222 56789	33333 01234	33333 56789	44444 01234	44444 56789	55555 01234	55555 56789	66666 01234	66666 56789	77777 01234	777 567
	6122	30151	40270	05030	03030	30312	73702	00312	10202	04050	00004	04443	50033	23303	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	70000	03030	[illegible]	[illegible]	32022	21232	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	65623	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	01005	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	24002	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	00102	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	00072	50300	05150	51000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	5080b	[illegible]	bbb3[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	02020	00000	00303	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	45010	3010[illegible]	[illegible]	bbb34	[illegible]	[illegible]	[illegible]	[illegible]	10bb0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	40061	3030b	bb040	bbb34	35bb5	0bb00	[illegible]	[illegible]	10bb0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	30130	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	50260	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	00bb0	0bb00	bb10b	[illegible]	[illegible]	[illegible]	[illegible]
	7742	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	7852	40454	30300	30bbb	bbb34	65651	01010	10101	00101	03030	10100	00304	02020	30202	01010	103
	8463	32031	3008b	bb032	bbb34	30bb1	[illegible]	bb20b	b05bb	05bb0	3bb00	bb20b	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	bb20b	b05bb	05bb0	3bb00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	bb030	bbb34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	2024b	bb030	bbb34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	8972	32002	5001b	bb020	bbb16	40401	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	9482	30002	5035b	bb040	bbb18	60500	00000	00000	00000	40500	00000	00000	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b05bb	40bb0	2bb00	bb10b	[illegible]	[illegible]	[illegible]	[illegible]

[a]Fields indicated in Table XXXIX

APPENDIX D

CODE FOR OPTIONS

Code 1	Options not provided
Code 2	Optional courses provided
Code 3	Optional programs provided past the initial year
Code 4	Both optional courses and optional programs provided
Code 5	Electives provided

APPENDIX E

CODING FOR ENTRANCE REQUIREMENTS

Code 1	No entrance requirement
Code 2	Grade ten
Code 3	Sixty-seven High School credits
Code 4	One-hundred High School credits
Code 5	A High School diploma
Code 6	A High School diploma with a "B" standing in a specified grade twelve subject
Code 7	Matriculation (not further defined)